



**National Aeronautics  
and Space Administration**

**May 1, 2002  
AO 02-OSS-02**

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## **Announcement of Opportunity**

### **Mars Scout 2002**

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**Notice of Intent Due:**  
**Proposals Due:**

**June 3, 2002  
August 1, 2002**

## FOREWARD

The National Aeronautics and Space Administration (NASA) Office of Space Science (OSS) is releasing this Announcement of Opportunity (AO) to solicit proposals for Mars Scout investigations. Two types of investigations are being solicited. The first is for Mars Scout Mission investigations where the investigator is responsible for all aspects of a stand-alone space flight mission to be launched no later than December 31, 2007. The second is for a Mars Scout Mission of Opportunity investigation where the "parent" mission itself is sponsored by an organization other than the NASA OSS and requires a NASA selection for the U.S. investigation no later than December 31, 2003. Mars Scout Mission investigation costs to OSS are capped at \$325M (Fiscal Year 2003). Mission of Opportunity investigation costs to OSS are capped at \$25M.

Section 1: Description of Opportunity describes the scope of the solicitation, the two types of investigations that may be proposed in response to this AO, a summary of the selection process, and the schedule. Section 2: Mars Scout Goals and Objectives and Section 3: Mars Scout Constraints, Guidelines, and Requirements are applicable to both Mars Scout Mission investigations and Mission of Opportunity investigations. Section 4: Mars Scout Mission Investigations: Specific Guidelines and Requirements describes requirements specific to Mars Scout Mission investigations, Section 5: Mars Scout Mission of Opportunity Investigations: Specific Guidelines and Requirements describes requirements specific to Mission of Opportunity investigations. Section 6: Proposal Preparation and Submission, Section 7: Proposal Evaluation, Selection, and Implementation and Section 8: Conclusion are sections applicable to both the Mars Scout Mission investigations and the Mission of Opportunity investigations.

Proposers interested only in Mars Scout Mission investigations should pay particular attention to Section 4.

Proposers interested only in Mission of Opportunity investigations should pay particular attention to Section 5.

An Acronym list for this AO has been generated and is located in the Mars Scout Library.

MARS SCOUT  
ANNOUNCEMENT OF OPPORTUNITY  
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## **1.0 Description of Opportunity**

### **1.1 Introduction**

The National Aeronautics and Space Administration (NASA) Office of Space Science (OSS) announces the opportunity to conduct Mars science investigations through cost-capped Mars Scout space flight missions. This AO invites proposals for two types of Mars Scout investigations: Mars Scout Mission investigations that involve complete spaceflight missions including the experiment hardware, the spacecraft, launch services other than procurement of the launch vehicle itself, mission operations, and science team data analysis (including archiving); and Mars Scout Mission of Opportunity investigations for the execution of appropriate scientific investigations through participation in space missions sponsored by U.S. organizations other than NASA's OSS or non-U.S. organizations. Investigations proposed as Mars Scouts may include remote observations from Mars-orbiting spacecraft; missions that may deploy aerial or landed systems to study the Martian atmosphere, surface, interior, geopotential fields, and/or deep subsurface; and sample return missions. In all cases, however, Mars Scouts are intended to augment or complement and not duplicate major missions currently being planned as part of NASA's Mars Exploration Program (MEP) or those planned by foreign` space agencies (see Section 2.1).

The general goals of NASA's MEP and its relationship to the investigations solicited through this Announcement of Opportunity (AO) are described in Section 2. A more expansive and detailed discussion about the scientific goals and objectives of the MEP can be found in the Mars Exploration Payload Assessment Group Report (see Appendix C, the Mars Scout Library), as well as in the recommendations of the Space Studies Board document, entitled "Assessment of Mars Science and Mission Priorities," prepared by the National Research Council's Committee for Planetary and Lunar Exploration (COMPLEX; see Appendix C, the Mars Scout Library). Proposers to this AO are encouraged to utilize innovative ideas, technologies, and management practices to accomplish their proposed investigations. The short development schedule and low costs associated with Mars Scout investigations suggest and encourage innovative teaming and management arrangements between industry, university, and/or Government partners (see Sections 3.1 and 3.7.2 for more details). The selected teams will have considerable responsibility and authority to accomplish the entire mission investigation within the strict cost and schedule limits of the opportunity in so far as these liberties do not threaten the success of the mission. NASA oversight and reporting requirements will be required, however, to assure science investigation success in compliance with committed cost, schedule, performance, reliability, and safety requirements.

Proposers who are finally selected for this Mars Scout opportunity will be required to infuse/transfer (as appropriate and possible) new technology to space, nonaerospace firms, educational, other nonprofit organizations, and Government entities, to involve (as appropriate and possible) small disadvantaged businesses, women-owned small businesses (WOSB's), Historically Black Colleges and Universities (HBCU's), and/or other Minority Educational Institutions (MEI's), and to enhance public awareness of and appreciation for space exploration through Educational and Public Outreach (E/PO) activities.

Proposals for Mars Scout investigations will require careful tradeoffs between science yield and cost to produce investigations having the highest possible science impact for the lowest possible cost. Therefore, investigations proposed at or near the stated cost caps may be selected only if the scope of science is judged as particularly compelling. Accordingly, the NASA OSS cost for all phases of the investigation, including mission launch services and the spacecraft, will be a determining factor in selection through this AO and in final confirmation for flight of selected investigation(s).

Mars Scout Mission investigations are characterized as complete space flight missions launched no later than December 31, 2007, on Expendable Launch Vehicles (ELV's) to Mars. Investigations with anticipated launch dates beyond December 31, 2007, should be proposed in response to subsequent MEP AO's unless there is a compelling scientific rationale for them to be considered at this time. In any case, Mars Scout Mission investigations submitted in response to this AO must be for complete projects from project initiation (herein defined as the start of Phase B) through mission operations (Phase E), including analysis and publication of data in the peer reviewed scientific literature, delivery on a timely basis the data to NASA's Planetary Data System (PDS), and full implementation of an appropriate Education and Public Outreach (E/PO) program. Mars Scout Mission investigations are capped at \$325M (Note: unless otherwise stated all cost numbers in this AO will be stated in Fiscal Year (FY) 2003 dollars). Pending the submission of an adequate number of proposals of merit, NASA expects to select approximately four Mars Scout Mission investigations through this AO, each of which will be awarded funding up to \$500K to conduct Phase A Concept Studies lasting up to six months. NASA will review the results of these concept studies and ultimately confirm one or more Scout mission investigations for flight based on funding availability and scientific merit. Investigations not selected for Phase A Concept Study or flight may compete on future MEP AO's (subject to available funding in future years). Additional information specific to Mars Scout Mission investigations is provided in Section 4.0.

Mars Scout Mission of Opportunity investigations are characterized as being conducted through a "parent" space mission of any size sponsored by any organization other than NASA OSS, domestic or foreign, and having a total cost to NASA OSS of no more than \$25M. These investigations are always conducted on a no-exchange-of-funds basis with the organization sponsoring the parent mission. Any Mission of Opportunity investigation proposed in response to this AO must require a signed commitment before December 31, 2003, from the organization sponsoring the parent mission, even though the launch date may be at a later time. Regardless of cost, Mission of Opportunity investigations will be selected through this Mars Scout AO only when their perceived value is exceptionally high, and NASA does not guarantee the selection of a Mission of Opportunity investigation under this solicitation. Scout Mission of Opportunity investigations must also meet other program objectives for cost control, infusion and transfer of new technology, and enhancing education and the public understanding of science. Mission of Opportunity investigations may be selected with or without a required Phase A Concept Study. See additional information on Mission of Opportunity investigations in Section 5.0.

Proposals submitted in response to this AO will be evaluated by peer review equally on the basis of their scientific merit, technical merit, and the feasibility of the proposed approach for mission implementation, including cost risk. Proposals are required to demonstrate a commitment to education and public outreach, to technology infusion/transfer, and to participation of small disadvantaged businesses, including WOSB's, HBCU's, and other MEI's, although the full review

of plans for these activities is deferred to the end of the Phase A studies for the selected proposals. A full discussion of the evaluation criteria is provided in Section 7.2 of this AO.

At the end of the Phase A Concept Studies, NASA will conduct indepth reviews to evaluate the feasibility, readiness, and continued merit of the selected investigations and implementing teams (see *Guidelines and Criteria for the Phase A Concept Study* in the Mars Scout Library, Appendix C). This evaluation will specifically examine the end to end details of the proposed implementation plans, namely, any modifications of the scientific objectives, the proposed cost to NASA OSS, design details of the experiment hardware, plans for mission implementation including all technical and management factors, details of the education and public outreach programs, and plans for incorporation of small disadvantaged business and the infusion and transfer of new technology (as appropriate) for the investigation. As a result of this second evaluation, one or more Mars Scout Mission investigations and possibly one or more Mission of Opportunity investigations may be confirmed for implementation leading to flight.

## **1.2 Proposal Opportunity Period and Schedule**

The following schedule describes the major milestones for this Mars Scout AO:

AO release.....	May 1, 2002
Preproposal Conference .....	Release + 2 weeks
Notice of Intent to Propose due.....	June 3, 2002
Proposals due by 4:30 p.m. EDT .....	August 1, 2002
Non-U.S. Letters of Endorsement due .....	September 3, 2002
Selections announced (target) .....	early December 2002
Phase A Concept Study Reports due (target) .....	May 2003
Confirmation of investigation(s) for flight (target) .....	August 2003



## 2.0 Mars Scout Goals and Objectives

### 2.1 Mars Exploration Program Goals

The broad goals of the Mars Exploration Program (MEP) and guidance of where it fits relative to the strategic plan for NASA's Space Science Enterprise in general may be found in "*The Space Science Enterprise 2000 Strategic Plan*" (see Appendix C, Mars Scout Library). The MEP is fundamentally a science driven program whose focus is on understanding and characterizing Mars as a dynamic "system," and ultimately addressing whether life is or was ever a part of that system. The MEP further embraces the challenges associated with the development of a predictive capability for Martian climate and how the role of water, obliquity variations, and other factors may have influenced the environmental history of Mars. The foundation of the scientific strategy for the MEP is also referred to as "follow the water." This strategy connects fundamental program goals pertaining to biological potential, climate, the evolution of the solid planet, and the development of knowledge and technologies applicable to the eventual exploration of Mars by humans.

The core MEP addresses the highest priority scientific investigations directly related to the Program goals and objectives. These planned investigations were derived by means of a highly inclusive process involving a large segment of the broad Mars/planetary exploration community. Mars Scout investigations are a means of addressing other high-priority scientific investigations recommended to NASA by the science community (e.g., NRC Committee for Planetary Exploration (COMPLEX) report of November 2001; and the Mars Exploration Payload Analysis Group (MEPAG) report of July 2001; see the Mars Scout Library, Appendix C).

The goals and objectives of the MEP are outlined below. Mars Scout investigations are also governed not only by these overall goals.

#### Scientific Goals and Objectives of the Mars Exploration Program

- Goal 1. Determine whether life ever arose on Mars:
    - Objective 1 – Determine if life exists today.
    - Objective 2 – Determine if life existed on Mars in the past.
    - Objective 3 – Assess the extent of prebiotic organic chemical evolution on Mars.
  - Goal 2. Characterize the Climate of Mars:
    - Objective 1 – Characterize Mars' present climate and climate processes.
    - Objective 2 – Characterize Mars' ancient climate.
  - Goal 3. Characterize the Geology of Mars:
    - Objective 1 – Determine the geological process that have resulted in formation of the Martian crust and surface.
    - Objective 2 – Characterize the structure, dynamics, and history of the planet's interior.
  - Goal 4. Prepare for human exploration of Mars:\*
- Objective 1 – Acquire appropriate Martian environmental data such as radiation.
  - Objective 2 – Conduct in-situ engineering and science demonstrations.

Objective 3 – Emplace infrastructure of relevance to future missions.

\*Note: although Goal 4 is an integrated element of the current MEP, it is considered of lesser immediate importance to this AO except in the area of acquiring appropriate environmental datasets.

## **2.2 Relationship of Mars Scouts to the NASA Mars Exploration Program**

Information with regard to Mars Exploration Program can be found at: <http://mars.jpl.nasa.gov>. A summary of the core missions in the MEP for the coming decade is as follows.

### **Mars Odyssey 2001**

- Launch: successfully achieved April 2001.
- Mars Orbit Insertion: successfully achieved October 2001.
- Prime Mission: 76 days aerobraking; prime science mapping mission from March 2002 through December 2003; Mars infrastructure function through October 2005.
- Science Payload:
  - Thermal Emission Imaging System (THEMIS).
  - Gamma Ray Spectrometer (GRS; recovery of Mars Climate Observer (MCO) experiment).
  - Mars Radiation Environment Experiment (MARIE).
- Primary Science Objectives:
  - Map the mineralogy and morphology of the Martian surface using a high-resolution camera and a thermal infrared imaging spectrometer.
  - Global mapping of the elemental composition of the surface and determine the abundance of hydrogen in the shallow subsurface.
  - Measure the near-space radiation environment, especially the radiation risk that may relate to human explorers.
- Mars Infrastructure Function:
  - Provide communications link for future Mars missions

### **2003 Mars Exploration Rover (MER) Mission**

- Launch: May/June 2003.
- Mars Landings: January 2004.
- Prime Mission: nominal 90 days surface operations or longer.
- "Athena" Science payload:
  - Panoramic Camera (Pancam).
  - Miniature Thermal Emission Spectrometer (Mini-TES).
  - Mössbauer Spectrometer.
  - Alpha-Particle X-ray Spectrometer.
  - Rock Abrasion Tool.
  - Microscopic Imager.
- Primary Science Objectives (at each of the two individual Rover sites):
  - Determine the aqueous, climatic, and geologic history where conditions may have been favorable to the preservation of evidence of prebiotic or biotic processes.

- Identify previous and/or extant hydrologic, hydrothermal, and other geological processes that have operated or are operating.
- Identify and investigate Martian rocks and soils that have the highest possible chance of preserving evidence of ancient environmental conditions associated with water and possible prebiotic or biotic activity.
- Respond to unanticipated Rover surface exploration discoveries.

### **2005 Mars Reconnaissance Orbiter (MRO)**

- Launch: August 2005.
- Enter Mars polar orbit: 2006.
- Prime Mission – one Mars year of high resolution imaging and orbital characterization of Martian surface, atmosphere, and shallow subsurface
- Science payload:
  - High resolution visible-near IR imaging spectroscopy (CRISM).
  - High-resolution visible imaging (HiRISE).
  - Infrared sounding and imaging of Martian atmosphere (MCS sounder).
  - Facility shallow-subsurface radar sounder provided by ASI.
  - Context Imager as a dual facility and PI instrument to provide < 10 m/pixel context imaging of all CRISM and HiRISE targets.
- Primary Objectives:
  - Recover the Mars Climate Orbiter MARCI and PMIRR (MCS) investigations, emphasizing Mars volatiles (water) and climate history.
  - Search for mineralogic and morphologic evidence of water-related processes on a global basis (and explore the mode of origin of layers).
  - Advance the understanding of the physical processes controlling the present transport, distribution, and past evolution of water on Mars.
  - Conduct detailed study of regions of high scientific interest, including the Mars Global Surveyor discovery sites associated with features such as gullies that potentially indicate "modern" surface water outflow processes.
- Mars Infrastructure Function:
  - 10 year extended mission as a telecommunication relay and navigation beacon.

Proposals for the MRO mission instrument and Facility Team investigations were solicited through NASA AO 01-OSS-02, and an AO that solicits Participating Scientists for this MRO mission may be issued in the future. Proposals for further participation in this mission are not solicited through this Mars Scout AO.

## **2007 Mars Launch Opportunity**

Mars Scout Missions investigations and/or Mars Scout Missions of Opportunity investigations are solicited through this Mars Scout AO. Any mission launched in 2007 would nominally be expected to enter its prime mission phase at Mars in 2008.

## **2009 Mars Launch Opportunity**

**NASA Mars Smart Lander:** The NASA MEP calls for the launch of a Mobile Surface Laboratory (MSL) powered by a radioisotope thermal electric generator that will operate for a full Martian year (687 days) or longer on the surface. Planned development of a new suite of miniature analytical instruments for this mobile laboratory tuned to questions of geochemistry and biological processes are expected to measure aspects of the surface and subsurface materials potentially linked with ancient life and climate. The lander will incorporate technological advances that allow it to land safely within a few kilometers or less of a scientifically compelling site identified from the Mars Reconnaissance Orbiter and other data.

An AO for this strategic MEP mission will be released by OSS at an appropriate time in the future; therefore, Mission investigation and Mission of Opportunity investigation proposals for the 2009 Mars launch opportunity are not solicited through this Mars Scout AO.

## **Foreign Missions with NASA MEP Participation**

The MEP includes significant U.S. collaboration in scientific investigations flown on missions that are sponsored by foreign civil space agencies. These investigations are intended to address several high priority scientific objectives not covered in the core MEP program. Except for the CNES (French Space Agency) Orbiter-07 (part of the French PREMIER-07 mission) there are NO OTHER known opportunities for Mars Scout Mission of Opportunity investigations on any of these missions. Therefore, except for the CNES Orbiter-07, there are no opportunities through this Mars Scout AO to further participate in these missions. Brief summaries of these missions, as known at the time of this AO's release, are provided below.

### **Nozomi – Institute of Space and Astronautical Science (ISAS)**

Launched in 1998, Nozomi will arrive at Mars in December 2003 to study the interaction of the solar wind with the Martian upper atmosphere. NASA is supporting the Neutral Mass Spectrometer that will explore this interaction.

### **Mars Express – European Space Agency (ESA)**

NASA is collaborating with several European civil space entities on scientific instruments to be flown on ESA's Mars Express mission, planned for launch in May or June 2003. Mars Express will study both the Martian atmosphere and the planet's surface. NASA is cooperating with individual European countries on the : French Spectroscopic Investigation of the Characteristics of the Atmosphere of Mars (SPICAM); Italian/U.S. Mars Advanced Radar for Subsurface and Ionospheric Sounding (MARSIS)

and Planetary Fourier Spectrometer (PFS); German High Resolution Stereo Camera (HRSC) and Mars Radio Science investigation (MaRS); Swedish Analyzer of Space Plasmas and Energetic Atoms-Version 3 (ASPERA-3); and British/ESA Beagle-2 lander.

#### PREMIER-07 – French Space Agency (CNES)

Planned for launch in 2007, this mission consists of the CNES Orbiter-07 and four small landers, collectively called NetLander. NetLander will conduct meteorological and geophysical investigations on the planet's surface. NASA, through a Discovery Program selection, will participate in three of the nine NetLander science packages, the French Seismometer (SEIS) and NetLander Ionosphere and Geodesy Experiment (NEIGE) and the Finnish Atmospheric and Meteorological Instrument System (ATMIS).

CNES Orbiter-07 science has not been defined. For CNES Orbiter-07, NASA will consider this opportunity for additional scientific collaboration through the Mars Scout Mission of Opportunity investigations via this AO. For more information on the CNES Orbiter-07 portion of the PREMIER-07 mission, see the CNES 2002 PREMIER Orbiter AO at <http://smsc.cnes.fr/PREMIER-2007/>.

#### G Marconi – Italian Space Agency (ASI)

There are no foreseeable opportunities for scientific instruments on this dedicated Mars communication orbiter. NASA and ASI plan to collaborate on the 2007 G. Marconi mission. The orbit of this high-data rate communications orbiter will be optimized to provide the best coverage for a variety of surface and suborbital assets launched in the 2007 and later opportunities. The orbiter's projected lifetime is 6 to 10 years.

### **3.0 Mars Scout Investigations: Constraints, Guidelines, and Requirements**

#### **3.1 General Constraints and Guidelines**

Only those investigations with proposed cost, design/development schedule, infrastructure requirements, and launch vehicle requirements that are within the constraints and guidelines identified herein will be considered as candidates for selection. These constraints and guidelines apply equally to Mars Scout Missions, as well as Mars Scout Missions of Opportunity.

The major responsibility for the selected investigation rests with the investigation team, which will have significant freedom to accomplish its proposed objectives within the stated schedule and financial constraints. This responsibility, however, will nonetheless be exercised with essential NASA oversight to ensure that it is responsive to the needs and constraints of the MEP and the capabilities of the Mars infrastructure as will be described in the sections below. Additionally, proposers are encouraged to incorporate advanced development (i.e., new technologies) to enable new and exciting scientific investigations. They should do so, however, only if they can show a credible plan for advanced development that leads to flight qualification consistent with the mission life cycle and/or have an adequate backup plan within the cost and schedule commitment (see Section 7.2.3). Once an investigation has been selected for flight, failure to maintain reasonable progress on an agreed upon schedule and cost, or failure to operate within the constraints outlined in this section may be cause for its termination by NASA.

Therefore, every aspect of a Mars Scout investigation must reflect a commitment to mission success.

Mars Scout Mission investigations must be headed by a single Principal Investigator (PI), who can be from any category of domestic and nondomestic organizations, including educational institutions, industry, nonprofit institutions, NASA Centers, the Jet Propulsion Laboratory (JPL), and other Government agencies. The Principal Investigator (PI) is responsible to NASA not only for the scientific integrity of the investigation, but also for the management of the complete mission, including provision of the spacecraft, instruments, ground system, and mission operations, data analysis, planning and implementation of an appropriate education and public outreach program, and timely archival of calibrated data into the PDS archive. All of these requirements also apply to a Mars Scout Mission of Opportunity with the added clarification that the application is for the OSS funded portion of the investigation only.

Participation in this AO will be open to all categories of organizations (foreign and domestic), including educational institutions, industry, not-for-profit organizations, Federally Funded Research and Development Centers (FFRDC's), NASA Centers, the Jet Propulsion Laboratory (JPL), and other Government agencies. Principal Investigators are responsible for and allowed to assemble the mission team from any and all of these organizations, with the following caveat. If project management and end-to-end systems engineering are to be implemented from a NASA Center, these functions must be performed by a NASA Center designated by the Enterprise to do so. For the Space Science Enterprise (OSS), these Centers are JPL and GSFC.

Every Mars Scout investigation must also define the risk management approach it intends to use (see *NPG 7120.5A in Mars Scout Library*, Appendix C) to ensure successful achievement of the investigation objectives within established resource and schedule constraints. Included in this discussion of risk management should be risk mitigation plans for new technologies and the need for any long-lead items that need to be placed on a contract before the start of Phase C/D, to ensure timely delivery. In addition, any manufacturing, test, or other facilities needed to ensure successful completion of the proposed investigation must be identified in the proposal.

### **3.2 Science Requirements**

Mars Scout investigations are intended to complement and potentially amplify the otherwise established NASA Mars Exploration Program (see Section 2.2 above). The relationship between the scientific objectives, the data to be returned, and the instrument payload to be used in obtaining the desired data must be unambiguous and clearly stated. Mars Scout investigation teams will be responsible for initial calibration, validation, and analysis of the data, its subsequent delivery to the NASA Planetary Data System (PDS) in calibrated format (i.e., with adequate documentation), and the timely publication of initial scientific results. (Note that information on the PDS, its formats, and its requirements is included in the Mars Scout Library, Appendix C.)

Proposals to this AO must also include an adequately budgeted data analysis period, independent of PDS archiving activities, as a part of the Phase E activities that is understood to include publication of scientific results of the investigation in refereed journals. Failure to do so shall be reason for declaring a proposal as being nonresponsive to this AO and its return without further review.

Following established NASA policy, there shall be no period of exclusivity for data rights for Mars Scout investigations. Mars Scout teams will be responsible for collecting the scientific, engineering, and ancillary information necessary to validate and calibrate the scientific data prior to delivery to the PDS. Data products delivered to the PDS shall be documented, validated, and calibrated in physical units useable by the scientific community at large. The time required to complete this process and make the data available to the scientific community and the general public should be six months or less. Proposers who offer to deliver suitably calibrated science measurement datasets before this time will be appropriately recognized for their efforts (see Section 7.2.2), since this will support a wider-community data analysis activity.

Any samples of extraterrestrial planetary materials returned by Mars Scout missions shall be delivered to the NASA Astromaterials Curatorial Facility located at NASA's Johnson Space Center (JSC) as per NASA Policy Directive (NPD) 7100.10C or current revision. The Curation Facility is described online at <<http://ares.jsc.nasa.gov/>>

Costs for use of the Curation Facility must be included in the NASA OSS cost for the proposed investigation (see Section 3.8.1 below). Information regarding such costs is contained in the document entitled *Anticipated Costs and Capabilities of the NASA Curatorial Facility – Mars Scout Sample Return Missions* that can be found in the Mars Scout Library. Investigation teams will be responsible for all aspects of the delivery of such materials to the Facility, which is responsible for providing for the physical security, inventory accountability, environmental preservation, and distribution of the samples in support of approved scientific research programs.

For any Mars Scout mission investigation in which extraterrestrial planetary materials are returned to Earth, the Curation Facility will also perform sample processing in support of the mission science team. In particular, the science team shall be allocated no more than 25 percent (by mass) of the returned sample unless a larger fraction can be fully justified by the nature of the proposed investigation. The remainder shall be kept in pristine condition for research by the community at large via the usual competitive, peer-review processes used within OSS.

Mars Scout missions will also be subject to the established protocols that address forward and back contamination with respect to Mars. In particular, it should be noted that the return of samples directly from Mars may be subjected to rigorous containment and biohazard-testing protocols, in accordance with NASA planetary protection policy (NASA Policy Directive (NPD) 8020.7E or current revision). Investigators proposing sample-return missions must address anticipated planetary protection requirements (see Mars Scout Library, Appendix C). Compliance with these requirements is discussed further in Appendix B, Section I.6 of this AO. For additional information proposers may contact the NASA Planetary Protection Officer (PPO); Dr. John D. Rummel (telephone (202) 358-0702 or E-mail to <[jrummel@hq.nasa.gov](mailto:jrummel@hq.nasa.gov)>).

### **3.3 Education, Public Outreach, Technology Infusion/Transfer, and Small Disadvantaged Business Requirements**

#### *3.3.1 Education and Public Outreach Requirements*

OSS expects education and public outreach (E/PO) to be a significant part of each OSS flight program and research discipline and strongly encourages space science researchers to engage

actively in education and public outreach as an important component of their NASA-supported professional activities. In order to achieve this goal, OSS has developed a comprehensive approach for making education at all levels (with a particular emphasis on K-14 education) and the enhancement of public understanding of space science integral parts of all of its missions and research programs.

The three key documents that establish the basic policies and guide all OSS E/PO activities are a strategic plan entitled *Partners in Education: A Strategy for Integrating Education and Public Outreach Into NASA's Space Science Programs* (March 1995), an accompanying implementation plan entitled *Implementing the Office of Space Science (OSS) Education/Public Outreach Strategy* (October 1996), and the *Explanatory Guide to the NASA Office of Space Science Education and Public Outreach Evaluation Criteria* (March 2002). These documents are available through the Mars Scout Library (see Appendix C) or, alternatively, may be accessed electronically by selecting "Education " from the menu on the OSS homepage at the World Wide Web address <http://spacescience.nasa.gov/>, or may be requested from Dr. Jeffrey Rosendhal, Office of Space Science, Code S, NASA Headquarters, Washington, DC 20546-0001, (E-mail at [jefferey.rosendhal@hq.nasa.gov](mailto:jefferey.rosendhal@hq.nasa.gov)). As a consequence of the policies adopted by OSS, a major, national space science E/PO outreach program is now underway. Information on the activities already supported through the OSS E/PO program may be found in the *OSS FY 2000 and 2001 E/PO Annual Reports*, which are also included in the Mars Scout Library.

In accord with these established OSS policies, E/PO shall be an integral element of the Mars Scouts, with 1-2% of its total program budget (excluding launch vehicles) allocated to it. Every proposal to this AO must contain an E/PO component following the guidelines contained in Section E of Appendix B. Additionally, the MEP has a program-level Public Engagement Plan (see the Mars Scout Library). Proposers to this AO will be required to coordinate their E/PO activities with and to complement this overarching Mars Public Engagement Plan. Further information on this plan may be obtained from Michelle Viatti at JPL ([Michelle.A.Viatti@jpl.nasa.gov](mailto:Michelle.A.Viatti@jpl.nasa.gov), ph 818-354-8774). Also note that this AO's goal for the involvement of small disadvantaged businesses and minority institutions (see Section 3.3.3) may be met in part through an appropriately planned E/PO program.

A detailed E/PO implementation plan will be developed by each selected investigation and delivered in conjunction with its Phase A Concept Study. As outlined in Section 7.4.3, the proposed plans for E/PO will play an explicit role in the evaluation of the Concept Studies leading to the confirmation of investigation(s) for development and flight (see the document *Guidelines and Criteria for the Phase A Concept Study* in the Mars Scout Library for additional information). Because of the scope of Mars Scout investigations, it is expected that a significant, multi-faceted, national E/PO effort will be associated with each individual, stand-alone mission. Consistent with their more limited scope, more focused efforts are acceptable for Mars Scout Missions of Opportunity. For these cases, coordination with the program-level Mars Public Engagement Plan will be especially important.

### *3.3.2 Technology Infusion and Transfer*

NASA seeks to infuse new technologies that enhance performance and reduce costs into its programs and to strengthen the mechanisms by which it transfers such technologies to the private sector, including the nonaerospace sector. The means by which NASA's Office of Space Science



plans to implement new technology is described in *The Space Science Enterprise Integrated Technology Strategy* (October 1998), which is included in the Mars Scout Library (see Appendix C). The Mars Exploration Program recognizes that Mars Scouts will likely need to introduce new technologies in order to enable new scientific investigations, enhance the investigation's science return, and/or reduce cost. Investigations dependent on new technology will not be penalized for risk provided an adequate and credible advanced development plan is described in the proposal (see Section 7.2.3 and Appendix B) and/or a reasonable back-up approach is presented that will assure the success of the investigation should the technology not prove viable.

A detailed advanced technology infusion and transfer implementation plan will be required by each selected investigation as part of its Phase A Concept Study. As outlined in Section 7.4, plans for advanced technology will play an explicit role in the evaluation of the Phase A concept studies and in the confirmation of investigation(s) for development and flight. See the document, *Guidelines and Criteria for the Phase A Concept Study*, in the Mars Scout Library for further information.

### *3.3.3 Small Disadvantaged Business and Minority Institutions*

Mars Scout proposers shall agree to use their best efforts to assist NASA in achieving its goals for the participation of small disadvantaged businesses (SDB's), women-owned small businesses (WOSB's), historically black colleges and universities (HBCU's), and other minority institutions (MI's) in NASA procurements. Investment in these organizations reflects NASA's commitment to increase the participation of minority concerns in the aerospace community and is to be viewed as an investment in our future. Note that the substantial involvement of minority colleges and universities in space science missions and research programs is also a key objective of the OSS E/PO program. Offerors other than small business concerns are also advised that contracts resulting from this AO will be required to contain a subcontracting plan that includes goals for subcontracting with small, small disadvantaged, and women-owned small business concerns; see Section XIII in Appendix A for information on goals and subcontracting plan requirements.

Instructions for the small disadvantaged businesses and minority institutions component of the proposal are contained in Section E of Appendix B. A detailed implementation plan will be developed by each selected investigation and delivered in conjunction with its Phase A Concept Study. As outlined in Section 7.4, participation goals and the quality and level of work performed by small disadvantaged businesses and minority institutions will play an explicit role in the evaluation of the Concept Studies leading to the confirmation of investigations for development for flight. See the document, *Guidelines and Criteria for the Phase A Concept Study*, in the Mars Scout Library for further information.

## **3.4 Technical Approach**

Mars Scout proposals must address all technical aspects of the scientific investigation from preliminary analysis and technical definition through delivery of the data to the PDS and their analysis. The document, NPG 7120.5A, *NASA Program and Project Management Processes and Requirements*, describes the activities, milestones, and products typically associated with Formulation and Implementation of projects and may be used as a reference in defining a team's mission approach (available through the Mars Scout Library, Appendix C). Note that while NPG 7120.5A does not define subphases, the OSS has defined "Formulation" as Phases A and B, and

"Implementation" as Phases C, D, and E. While, mission teams have the freedom to use their own processes, procedures, and methods to meet the requirements of NPG 7120.5A, they must be careful to accommodate such NASA recommendations and directions as those of the NASA Integrated Action Team (NIAT) see Mars Scout Library and in particular must plan to obtain Independent Verification and Validation (I V&V) from the NASA IV&V Facility in Fairmont, West Virginia (see *Guidelines and Criteria for the Phase A Concept Study*, in the Mars Scout Library for further information).

Expendable Launch Vehicles (ELV's) for Scout Mission investigations must either utilize the ELV's provided by NASA Launch Services and funded by NASA (as part of the total Mars Scout mission cost), or be provided by the proposer as a contribution (see Section 3.8.3). As indicated in Section 3.8.3, contribution of a U.S. ELV is **not allowed** for this AO. Whatever the approach, these services must be consistent with NPD 8610.7, NASA Launch Services Risk Mitigation Policy. See Sections 4.1 and 5.1 of this AO for additional discussion of Launch Services for Mars Scout Missions and Mars Scout Missions of Opportunity, respectively.

Each Mars Scout project shall have a cost-effective mission assurance program that is consistent with the ISO 9000 series, American National Standard, *Quality Systems - Model for Quality Assurance in Design, Development, Production, Installation, and Servicing*, ANSI/ASQC Q9001-1994 (available through the Mars Scout Library, Appendix C).

Flight of significant quantities of nuclear material can significantly increase the cost and schedule risk of a mission. Therefore, radioisotope based sources of electrical power requiring significant quantity of nuclear material, such as Radioisotope Thermoelectric Generators (RTG's), are **not** permitted on Mars Scout missions proposed to this AO. The use of other, smaller radioactive sources such as radioisotope heating units (RHU's) or instrument calibration sources is permitted. However, even this usage will require additional environmental review documentation consistent with NASA policy and procedures (14 CFR Part 1216, Subpart 1216.3), the National Environmental Policy Act of 1969, as amended (NEPA) (42 U.S.C. 4321 *et seq.*), and the Council on Environmental quality (CEQ) Regulations for Implementing the Procedural Provisions of NEPA (40 CFR Pars 1500-1508)(Mars Scout Library, Appendix D). Missions that use RHU's will be also be required to complete a separate administrative process for nuclear safety launch approval (Presidential Directive/National Security Council Memorandum No. 25). Proposers are, therefore, urged to minimize the quantity of radioactive material employed. As a general rule, as the quantity of radioactive material to be used increases, the complexity of the environmental review and the separate launch approval processes also increases with the attendant schedule and cost risks.

Investigation teams are welcome to use currently available NASA navigation, tracking, control, communications, and other services; e.g., Deep Space Network (DSN), or Advanced Multimission Operations System (AMMOS). Non-NASA capabilities may also be used if they are technically appropriate and cost effective. The costs for such services, whether obtained from NASA or from other sources, must be included in the proposed cost estimate. Cost information for NASA provided services, as well as a list of required communications system parameters, can be found in *NASA's Mission Operations and Communications Services* document available in the Mars Scout Library, Appendix C. Proposers seeking additional information about DSN and/or AMMOS facilities and services should consult the DSMS Future Missions Planning Office web site: <http://deepspace.jpl.nasa.gov/advmiss>.

### 3.5 Mars Exploration Program Infrastructure Capabilities and Requirements

The MEP has developed an integrated Telecom and Navigation Strategy based on an evolving orbital infrastructure, standardized, interoperable communications/navigation services, and time-phased capabilities matched to the scientific and engineering needs of the Program. The strategy involves implementing a Mars Network through a combination of two approaches: (1) a standardized proximity link communications/navigation payload (see the *Mars Relay Description for Scout 2007 Proposals* and *Electra Mars Proximity Link Communications and Navigation Payload Description* in the Mars Scout Library) deployed on every long-lived (greater than 1 Mars year) Mars science orbiter, and (2) the implementation of a dedicated telecommunications satellite (G. Marconi) in partnership with the Italian Space Agency. This combined strategy will put in place an initial Mars Network infrastructure with gradually increasing capability and with redundant on-orbit assets. Proposers to this AO are required to provide sufficient information so that the use of such infrastructure resources can be evaluated (see Appendix B).

As a matter of policy, the MEP requires that missions with more than one Mars year of expected life in Mars orbit must carry a UHF communications package (See *Electra Mars Proximity Link Communications and Navigation Payload Description*, in the Mars Scout Library) to provide telecommunications support for data relay for future missions and to provide support during critical events (see further details in Section 3.6 below). Scout orbiter missions required to carry such a UHF relay will have it provided as GFE at no cost to the proposer, although its integration into the payload will be the responsibility of the proposer. Relay operations should not significantly impact the nominal Scout science orbiter mission; the UHF relay will be used to support missions launched in the 2009 launch opportunity or later. Furthermore, the operations of the Scout science orbiter UHF relay payload for other Mars missions will be paid for by the MEP. Proposals for such qualifying missions must discuss the technical approach, including schedule and cost, for implementing the UHF relay in the event of selection.

Proposers must also be aware that the MEP expects to extensively use NASA's Deep Space Network (DSN) in the 2008 and beyond timeframe, including simultaneous tracking of more than one mission at Mars for the planned Mars missions discussed in Section 2. Since DSN resources are limited, proposers are advised to propose their support accordingly to avoid excessive demands. To assure that requirements and costs are correctly evaluated, proposers should provide detailed information regarding all DSN usage as outlined in *NASA's Mission Operations and Communications Services* document (see Mars Scout Library Appendix C). The specific needed proposal information is also discussed in Appendix B.

Proposers are advised that a Lander platform originally planned for use in an earlier version of the 2001 lander mission is in bonded storage as the property of NASA and can be made available as Government Furnished Equipment (GFE) to proposers to this solicitation. Details about this item including a point of contact are provided in the *Mars 2001 Lander Description* document that is located in the Mars Scout Library, Appendix C. Proposers who may want to use this item are advised that NASA is offering it on equal terms "as is." Anyone proposing its use shall: 1) assume complete responsibility for its utilization; 2) ensure that, if used, it will be flight qualified for its specific proposed flight configuration; 3) provide complete technical discussion in their proposal of the approach and concept for its modification (if required), development, and flight

as would be required for any other proposed flight hardware; and 4) ensure that any and all costs associated with its utilization are accounted for and included in the proposal.

In addition, MEP has a technology development program called the Mars Technology Program (MTP) which is developing technologies for Mars that may be of interest to Scout proposers. Further overview information for the MTP is contained in the overview document "Mars Technology Program Overview" located in the Mars Scout Library. Proposers wishing to obtain further information about the MTP should contact the MTP manager, Dr. Samad Hayati at Email: Samad.A.Hayati@jpl.nasa.gov, Jet Propulsion Lab Mail Stop 264-438, 4800 Oak Grove Drive, Pasadena, CA, 91109, ph (818) 354-8273, fax (818) 393-3035. Proposers should be cautioned, however, that anyone using any such technology must: 1) assume complete responsibility for its utilization; 2) ensure that if used, it will be flight qualified for its specific proposed flight configuration; 3) provide complete technical discussion in their proposal of the approach and concept for its modification (if required), development, and flight as would be required for any other proposed flight technology; and 4) assure that any and all costs associated with its utilization are accounted for and included in the proposal.

### 3.6 Critical Event Coverage

The MEP requires that Scout missions plan for and provide critical event data that can be recovered for adequate anomaly reconstruction should one occur. Critical events are defined as events that could result in the early loss of the mission (e.g., orbit insertion, entry/descent/landing, etc.). Critical event coverage can be provided in any fashion that is most appropriate for the proposed investigation, including the use of Mars infrastructure and/or DSN tracking resources. Proposals must discuss the technical approach and implementation concept by which this requirement will be achieved in sufficient detail to allow evaluation (also see Appendix B).

### 3.7 Management Requirements

#### *3.7.1 Roles and Responsibilities of the Principal Investigator*

The PI is expected to be the central person in charge of each Mars Scout investigation, with full responsibility for its scientific investigation and all other aspects including the E/PO program. The PI is responsible for assembling and proposing a team adequate to assist him/her to implement all proposed tasks. The PI is accountable to NASA for the scientific success of the investigation and will be responsible for developing a draft set of Level I requirements for their investigation during the Phase A Concept Study, which will serve as an input to the formal documentation and approval of these requirements in Phase B. The PI must also be prepared to recommend project termination if, in his/her judgment, the successful achievement of established minimum science objectives, as defined in the proposal as the Performance Floor, is not likely within the committed cost and schedule reserves.

NASA intends to give the Principal Investigator and his/her team the ability to use their own management processes, procedures, and methods to the fullest extent possible. Therefore, Mars Scout investigation teams should define the management approach best suited for their particular teaming arrangement. This approach should be commensurate with the investigation's implementation approach, while retaining a simple and effective management structure that ensures adequate control of development within the cost and schedule constraints. The investigation team should develop a Work Breakdown Structure (WBS; see Section NPG 7120.5A in the Mars Scout Library) that best fits its organizational approach and mission design concept.

#### *3.7.2 Roles and Responsibilities of Project Management*

Each Mars Scout Mission investigation must have a Project Manager (PM) who will oversee the end-to-end systems design and technical implementation of the project and whose responsibilities, qualifications, and experience must be adequate to ensure the technical and managerial needs of the investigation (see Section 3.1 and NPG 7120.5A in the Mars Scout Library for additional details). Project management will also include the award and management of subcontracting arrangements. While in general this requirement is also valid for a Mars Scout Mission of Opportunity, depending on the nature and complexity of the proposed investigation and extent of need for oversight of integrated systems engineering and technical coordination, a PM may or may not be needed. When a PM is not proposed, the proposer must provide a rationale for the exclusion.

### 3.7.3 Roles and Responsibilities of Co-Investigators

A Co-Investigator (Co-I) is defined to be a member of the proposing team other than the PI who plays a necessary role in the proposed investigation and whose services are either funded by NASA through the proposal or are contributed by that Co-I's institution. If funded by NASA, the Co-I's costs must be accounted for in the NASA OSS Cost. If contributed, the costs must be accounted for in the Total Mission Cost and an endorsement letter from the proposed Co-I's institution must be provided with the proposal. The role of each Co-Investigator must be described in the proposal; see Appendix B for additional details.

## 3.8 Cost Requirements

### 3.8.1 NASA OSS Cost and Total Mission Cost

A major goal of Mars Scout investigations is to provide the highest science value for cost. Therefore, the NASA OSS cost will be a factor in the final selection of Mars Scout investigations through this AO (see Section 7.3) and in their continuing assessment during the Phase A Concept Studies. Note that the cost caps for Scout Mission investigations are specifically discussed in Section 4.5.2 and for Scout Mission of Opportunity investigations in Section 5.4.2.

All proposals must provide an estimate of the NASA OSS Cost, which is defined as the funding that NASA OSS would be expected to provide to execute the investigation, including the cost of the Phase A Concept Study, all costs in Phases B through E (including planning and implementation of an E/PO program), reserves, and contract fees. Generally, all costs must be included in the NASA OSS Cost unless specifically excluded. Examples of costs to be included in all proposals are: ELV launch service costs (unless contributed) (see *Mars Scout Launch Services* in the Mars Scout Library); NASA DSN support as may be required (see *NASA's Mission Operations and Communications Services* in the Mars Scout Library); E/PO activities; technology infusion and transfer; subcontracts (including fees); salaries for personnel required to conduct the investigation, analyze and publish results, and deliver data in archival format to the PDS; insurance; Navigation and Ancillary Information Facility (NAIF) services; NASA astromaterial curatorial support (if required; see Section 3.2); and all labor (including contractor and Civil Servant).

In addition, proposals must provide an estimate of Total Mission Cost (TMC), defined as the NASA OSS Cost plus any additional costs that are contributed or provided in any way other than through OSS. The TMC will define the total value of the Mission or Mission of Opportunity investigation.

The specific cost information required for proposals is discussed in Appendix B. Since final cost details are not anticipated until the conclusion of the Phase A Concept Studies, cost estimates in the proposal may be generated using commonly accepted methodologies including grassroots estimates, cost models, or cost estimating relationships from analogous missions. In any case, however, the estimate methodology must be clearly explained to show how the estimate was developed and to defend its credibility. Also note that for investigations selected for a Phase A Concept Study through this AO, the proposed cost to NASA OSS at the conclusion of the Concept Study is not allowed to increase by more than 20 percent from that in the original

proposal and in any event must not exceed the Mars Scout cost caps in Section 4.5.2 or 5.4.2 nor exceed the yearly funding limits for the Mars Scout project shown in Appendix E with the exception of the extraordinary circumstances noted there. Subsequent to confirmation for Phase C/D, any further cost increase for the remainder of the investigation life cycle shall be cause for review for cancellation of the investigation.

### *3.8.2 Full Cost Accounting for NASA Facilities and Personnel*

If NASA-provided services are proposed to carry out the investigation, NASA Civil Service labor and supporting NASA Center infrastructure must be costed on a full cost accounting basis. If NASA guidance for full cost accounting has not been fully developed by the closing date for proposal submission or for completion of the Phase A concept studies, NASA Centers may submit full cost proposals based on the instructions in the *NASA Financial Management Manual*, Section 9091-5, Cost Principles for Reimbursable Agreements (see Appendix C). If any NASA costs are to be considered as contributed costs, the contributed item(s) must be separately funded by an effort complementary to the proposed investigation and the funding sources must be identified. Other organizations of the Federal Government participating in a proposal must follow their own cost accounting standards for full cost. If no standards are in effect, such proposers must then follow the Managerial Cost Accounting Standards for the Federal Government as recommended by the Federal Accounting Standards Advisory Board.

### *3.8.3 Contributions*

Contributions of any kind, whether cash or noncash (property and services), are welcome to Mars Scout investigations by organizations other than the Office of Space Science. Values for all contributions of property and services shall be established in accordance with commonly used and accepted cost principles. Such contributions may be applied to any part or parts of a proposed investigation. A letter of endorsement must be submitted with the proposals from all U.S. contributors that provide evidence that the responsible institution and/or government officials are aware and supportive of the proposed contribution and will pursue funding for the contribution if selected by NASA. For non-U.S. contributors to proposals, see Section 3.9.

An exception to the above policy is that a contribution of U.S. Expendable Launch Vehicles (ELV's) for primary launch services for Mars Scout Mission investigations is not allowed by this AO. ELV's must either be provided by NASA, as discussed in Section 4.1, or be a qualifying non-U.S. contribution as discussed in Section 3.4.

The cost of contributed hardware or software should be estimated as either: 1) the cost associated with the development and production of the item if this is the first time that it has been developed and if the investigation represents the primary application for which the item was developed; or 2) any recurring and investigation-unique costs if this is not a first-time development. The cost of hardware or software that is inherited from other sources should be estimated as the cost to the proposer to prepare the inherited hardware or software for flight. The proposal should indicate the level of development assumed for any inherited hardware or software before its use would incorporate it into the proposed project.

The cost of contributed labor and services must be consistent with rates paid for similar work in the offeror's organization. The cost of contributions does not need to include funding spent

before the start of the investigation should it be selected (i.e., before executing a contract for development with NASA). The value of materials and supplies shall be reasonable and shall not exceed the fair market value of the property at the time of the contribution. Funding limitations of contributions for Mars Scout Mission investigations are further defined in Section 4.4.

### **3.9 Guidelines Applicable to Foreign Proposals and Proposals Including Foreign Participation.**

#### *3.9.1 General*

NASA welcomes proposals from outside the U.S. However, foreign entities are generally not eligible for funding from NASA. Therefore, unless otherwise noted in the AO, proposals from foreign entities should not include a cost plan unless the proposal involves collaboration with a U.S. entity, in which case a cost plan for only the participation of the U.S. entity must be included. Proposals from foreign entities and proposals from U.S. entities that include foreign participation must be endorsed by the respective government agency or funding/sponsoring institution in the country from which the foreign entity is proposing. Such endorsement should indicate that the proposal merits careful consideration by NASA, and if the proposal is selected, sufficient funds will be made available to undertake the activity as proposed. (Also see Section 3.9.9 below.)

#### *3.9.2 Proposal Preparation, Submission, and Selection*

All foreign proposals must be typewritten in English and comply with all other submission requirements stated in the AO. All foreign proposals will undergo the same evaluation and selection process as those originating in the U.S. All proposals must be received before the established closing date. Those received after the closing date will be treated in accordance with Section 6.3. Sponsoring foreign government agencies or funding institutions may, in exceptional situations, forward a proposal without endorsement if endorsement is not possible before the announced closing date. In such cases, the NASA sponsoring office should be advised when a decision on endorsement can be expected. Successful and unsuccessful foreign entities will be contacted directly by the NASA sponsoring office. Copies of these letters will be sent to the foreign sponsor. Should a foreign proposal or a U.S. proposal with foreign participation be selected, NASA's Office of External Relations will arrange with the foreign sponsor for the proposed participation on a no-exchange-of-funds basis, in which NASA and the foreign sponsoring agency or funding institution will each bear the cost of discharging their respective responsibilities. Successful and unsuccessful foreign entities will be contacted directly by the NASA sponsoring office, and copies of these letters will also be sent to the foreign sponsor. (Also see Subsection 3.9.3 below and Sections 6.0. and 7.0.)

#### *3.9.3 Potential International Agreements*

Depending on the nature and extent of the proposed cooperation, these arrangements may entail the following (see Appendix B.I.5).

An exchange of letters between NASA and the foreign sponsor; or  
A formal Agency-to-Agency Memorandum of Understanding (MOU).



### *3.9.4 Benefits and Risks*

International cooperation offers potential scientific, technical, and financial benefits. International cooperation can add to management complexity and risk, and foreign and/or domestic proposers should limit cooperative arrangements to those offering significant material benefits while maintaining clear technical and management interfaces. The proposal should discuss any risks and benefits of proposed cooperative arrangements, as well as management approaches to mitigating these risks.

### *3.9.5 Foreign Contributions*

International participation may include, but is not limited to, the contribution of scientific instruments, a spacecraft (or a portion thereof), and the subsequent sharing of the data from the mission, all at no cost to NASA. Launch vehicles and launch services may also be contributed by international partners, on a cooperative (no-exchange-of-funds) basis, consistent with U.S. Government policy; however, as with other contributions, these costs are subject to the limit described in Section 4.4 for Mars Scout Mission investigations and must be included in all calculations and discussions of the total mission costs.

### *3.9.6 Purchase of Goods and/or Services*

The direct purchase of goods and/or services from foreign sources is permitted with the restriction that NASA will not purchase foreign launch vehicles for any investigation proposed to this AO, nor may funds provided to a Mars Scout investigation team be used to purchase a launch vehicle from a foreign source. As noted in subsection 3.9.5, above, the provision of launch services as a contribution to a Mars Scout investigation by a foreign partner is acceptable only at no cost to NASA. In the case of any such contribution, the performance record of a proposed launcher will be considered in assessing the likelihood of success for the proposed investigation (see Section 3.4).

### *3.9.7 Contracts and Subcontracts*

Potential Mars Scout participants are advised that a contract or subcontract using funds derived from NASA by a U.S. proposal with foreign participants must meet all applicable NASA and Federal regulations. Information regarding regulations governing the procurement of foreign goods or services can be found in the Federal Acquisition Regulations (FAR's) and the NASA FAR Supplements which can be accessed via the Mars Scout Library (see Appendix C). These regulations may place a significant additional burden on investigation teams that must be explicitly addressed in the discussion of the investigation's cost, schedule, and risk management.

### *3.9.8 Costs Plans and Endorsements*

Proposals from foreign entities that include U.S. participants, and proposals from U.S. entities that include foreign participation, must include a cost plan for the U.S. entities, and, at a minimum, the integrated value of the contribution of each foreign entity. In addition, participation by foreign individuals and/or institutions who are team members or contributors to Mars Scout investigations must be endorsed by the appropriate institutions and governments that are involved. Such letter(s) of endorsement must provide evidence that the institution(s) and/or

appropriate government official(s) is (are) aware and supportive of the proposed investigation and that sufficient funding to undertake the activity as proposed will be made available if the proposal is selected by NASA. The endorsement(s) must be submitted per the schedule in Section 1.2. In exceptional cases, proposals containing a foreign component can be submitted without endorsement if the endorsement is not possible before the announced due date for proposals. In such cases, a cover letter with the proposal should indicate when a decision on endorsement can be expected and must be provided before NASA can confirm the investigation (i.e., before the start of Phase B).

### *3.9.9 U.S. Export Laws and Regulations*

Proposals from foreign entities that involve U.S. entities or individuals and proposals from U.S. entities that involve foreign entities or individuals must include in the proposal a draft plan discussing compliance with U.S. export laws and regulations. Prospective proposers are advised that under U.S. law and regulation, spacecraft and their specifically designed, modified, or configured systems, components, parts, etc., such as the instrumentation being sought under this AO, are generally considered "Defense Articles" on the United States Munitions List and are subject to the provisions of the International Traffic in Arms Regulations, 22 CFR 120-130, *et seq.* (See Appendix B.I.4)

## **4.0 Mars Scout Mission Investigations: Specific Guidelines and Requirements**

### **4.1 Launch Services**

Mars Scout Mission proposals must be for complete science investigations that are accomplished by free-flying missions to Mars. Mars Scout Missions may be launched using expendable launch vehicles (ELV's) that are either provided by NASA with NASA funding or by the proposer by way of a contribution. The launch services that NASA is prepared to provide are described in the *Mars Scout Launch Services Information Summary* in the Mars Scout Library, Appendix C. The launch service costs of any NASA-provided ELV must be included in the proposal's NASA OSS cost (see Section 3.8.1). If the investigation is selected, NASA expects to contract with the appropriate U.S. launch service provider to acquire the launch service for the investigation. (Note: NASA seeks to take advantage of all reasonable sources of commercial ELV services while assuring that NASA-funded payloads are not exposed to excessive risk (see Section 3.4), therefore, demonstrated reliability of the proposed launch vehicle and the resultant probability of mission success will be evaluated by NASA and factored into the feasibility of mission implementation evaluation criteria (see Section 7.2.3).)

Launch services may also be proposed at no cost to NASA as part of a teaming proposal with a non-U.S. partner. However, such launch services must be consistent with NASA Policy Directive (NPD) 8610.7, *NASA Launch Services Risk Mitigation Policy* as discussed in Section 3.4. Whether the mission is proposed for launch as a primary or secondary payload on a contributed ELV, the proposer must identify the opportunity and provide evidence in the proposal that the launch service provider agrees to manifest the investigation should the proposal be selected and confirmed for flight.

It is the responsibility of the proposer to find an organization that will contribute a launch if a contributed launch is part of the proposal. The demonstrated reliability and the resultant

probability of mission success will be evaluated as described above. The use of non-U.S. provided launch services must also meet the additional constraints and requirements of Sections 3.8.3 and 3.9.

## **4.2 Baseline Mission and Performance Floor**

Every Mars Scout Mission investigation must have both a "Baseline" investigation and a "Performance Floor." The Baseline refers to that investigation that, if fully implemented, will accomplish the entire set of proposed scientific objectives. Any alteration that results in a reduction of the investigation's ability to accomplish the Baseline scientific objectives will be considered a descoping of the investigation. In such a case, the remaining set of achievable scientific objectives will be reviewed by NASA to ensure that the investigation remains at or above the Performance Floor, which is defined as the minimum science return below which the investigation is not considered justified for the proposed cost. The Performance Floor must be identified and documented for each proposed Mars Scout Mission investigation along with plans for the prioritized descoping of mission capabilities from the Baseline to the Performance Floor in the event of cost or schedule growth. The differences between the Baseline Mission and the Performance Floor will be assessed to determine the investigation's resiliency in the event that development problems lead to reductions in scope. In addition, the investigation team will negotiate a set of performance metrics during the definition phase for evaluation, including cost, schedule, and other factors as appropriate. Failure to maintain a level of science return at or above the Performance Floor as determined by NASA may be cause for termination of the investigation.

### **4.3 International Participation**

All factors and conditions given in Section 3.9 apply to Mars Scout Mission investigations. Any proposed international participation must be described at the same level of detail as that expected of U.S. participants to the maximum extent practicable. NASA will seek to validate contribution, cost, schedule, and management data during evaluation of the proposal and in subsequent reviews. Failure to adequately document foreign contributions, including all applicable cost and schedule data, and management approaches and techniques, or failure to document the commitment of all team partners to those costs and schedules, may cause a proposal to be found unacceptable for selection.

### **4.4 Contributions**

Contributions of any kind, whether cash or noncash (property and services) to Mars Scout Mission investigations by organizations other than the NASA OSS are welcome, but the sum of contributions to a given Mission investigation may not exceed one third of the total proposed OSS cost (see Sections 3.8.1 and 4.5). Values for all contributions of property and services shall be established in accordance with applicable cost principles. Such contributions may be applied to any part or parts of a Mission investigation, but must be included in the calculation and discussion of the Total Mission Cost. A Letter of Endorsement that contains a statement of financial commitment from each responsible organization contributing to the investigation must be submitted with the proposals for all domestic components. For non-U.S. components of proposals, see Section 3.9. Such Letters of Endorsement are required to assure NASA that all contributions can and will be provided as proposed.

### **4.5 Schedule and Cost Requirements**

#### *4.5.1 Schedule*

The schedule for Mars Scout Mission investigations selected through this AO is expected to be such that launch can take place by December 31, 2007. The proposer must specify the launch date and indicate launch date flexibility (if any) in the proposal.

The Mars Scout project is intended to accomplish important scientific investigations on a rather rapid time scale, so the schedule for all Mars Scout Missions must be such that the launch takes place no later than 35 months after the start of the design/development phase (Phase C/D). Phase A has been defined by OSS as the Concept Study and Phase B as the Preliminary Design phase ending approximately one month after Preliminary Design Review. The design/development phase (Phase C/D) is defined as ending 30 days after launch, so the maximum permissible length of any Mars Scout Mission Phase C/D is 36 months. No constraint is placed on the length of Phase B or Phase E for mission operations, data analysis, and the implementation of the mission E/PO program, although both phases could be restricted by the cost caps for Mars Scout (see Section 4.5.2 below). Procurement of long-lead items is permitted during the Phase B timeframe, but if so proposed, such items must be clearly identified and appropriately justified on the basis of schedule criticality and the funding necessary to initiate procurement clearly identified in the budget for Phase B. The overlap between Phase B and C/D long-lead procurements will not be considered when determining the length of Phase C/D.

#### 4.5.2 NASA OSS Cost Requirements and Cost Caps

The Mars Scout is part of NASA's effort to develop space science investigations of modest scope. To this end, the NASA OSS cap for the cost for any one Mars Scout Mission investigation, including all mission phases and the launch vehicle, is restricted to \$325M (FY 2003) at the time of selection. In addition, the total funding requirements for all Mars Scout investigations selected through this AO must be compatible with the funding profile shown in Appendix E (except as noted), which will necessarily govern expenditures by development phase.

Although NASA plans to fund directly the costs for U.S. launch services, these costs are nonetheless to be included in the proposal. For NASA-provided ELV's, the ELV launch services cost to be used to calculate the NASA OSS Cost for an investigation is provided in the *Mars Scout Launch Services Information Summary* available in the Mars Scout Library.

Scout mission investigation must also include funding to be used for services such as DSN tracking and communications and these costs must be included in the OSS cost cap.

The specific cost information required for all Mars Scout Mission proposals is discussed in Appendix B.

#### 4.5.3. Total Mission Cost

As discussed in Section 3.8.1, the Total Mission Cost is defined as all costs necessary to complete an investigation beginning with Phase A study immediately after selection, through Phase E, including NASA OSS costs, other NASA costs as may be proposed, non-NASA Civil Servant costs, and contributions from all U.S. and non-U.S. entities. In general, proposers should assume all costs must be included unless specifically excluded by provision in this AO.

Proposers must estimate the Total Mission Cost in the proposal as described in Appendix B, to ensure that all elements of the investigation are funded. The Total Mission Cost, including contributions (which are subject to the one third rule described in Section 4.4), may exceed the NASA OSS Cost cap of \$325M.

### 4.6 Selection and Cost Limits

Mars Scout Mission investigations selected through this AO will be awarded up to \$500K each for a Phase A Concept Study lasting up to six months. At the conclusion of the Phase A Concept Study, one or more investigations may be confirmed to proceed into subsequent mission phases. NASA will not continue funding for those investigations not selected to proceed although such investigations may be repropose for later Mars flight opportunities.

The Phase A Concept Study will be conducted by each mission investigation team selected via this AO whose cost must be included in the initial proposal (i.e., up to \$500K must be included in the proposer's total cost to OSS). See the *Guidelines for Phase A Concept Study Preparation* available in the Mars Scout Library.

During the Phase A Concept Study, the NASA OSS cost shall not increase by more than 20 percent from that offered in the original proposal and, in any event, must not exceed the NASA OSS cost cap of \$325 M, nor the annual funding profile maximums shown in Appendix E except as noted. Thereafter, this cost should not increase from that offered at the conclusion of the Phase A Concept Study. Each mission's Phase A Concept Study must conclude with a commitment by the PI for the cost, schedule, and scientific performance of the investigation. If at any time the cost, schedule, or scientific performance commitments appear to be in jeopardy, the investigation will be subject to a review for its cancellation. The MEP does not maintain a reserve from which investigations exceeding their cost commitments may draw.

## **5.0 Mars Scout Mission of Opportunity Investigations: Specific Guidelines and Requirements**

### **5.1 General Guidelines and Requirements**

By support of U.S. participation in Scout Missions of Opportunity, NASA seeks to allow the U.S. scientific community to take advantage of space missions sponsored by non-OSS organizations to execute a science investigation of interest to NASA's MEP. Typically, such "parent" missions are sponsored by non-U.S. governments, although missions from other U.S. agencies, NASA organizations other than OSS, or private sector organizations may be equally qualified. However, a Mission of Opportunity investigation on a military mission is allowed only if the mission is not planned for weapons testing. In any case, the total cost to NASA for a Mars Scout Mission of Opportunity through this AO is limited to \$25M.

A Mars Scout Mission of Opportunity can take many forms, such as providing a complete science instrument, providing hardware components for a science instrument sponsored by an organization other than NASA OSS, providing scientific expertise for the execution of a non-OSS investigation being carried on the mission, and/or purchase of MEP-relevant data from the mission. In all cases, however, while the U.S. proposer is not required to document or justify the entire "parent" mission to NASA, the investigator must fully document their intended investigation, its interfaces with their spacecraft, launch system, its requirements on that mission, and its relationship to the MEP objectives. For its part, NASA will evaluate only the proposed Mars Scout investigation and not the sponsor's entire parent mission. Evaluation of Mission of Opportunity investigations will be conducted utilizing the evaluation criteria as discussed in Section 7.2 of this AO. Specific information required of all Scout Mission of Opportunity investigations is discussed in Appendix B.

Note that selection of a Mission of Opportunity investigation by NASA through this AO does not constitute selection of the investigation as part of the mission, which necessarily is a decision made by the sponsor of the parent mission. Instead, selection is a commitment by NASA to fund the proposed U.S. portion of the investigation as part of the Mars Scout, under the condition that funding beyond basic studies will not begin until full approval and detailed design of the mission itself by its sponsoring organization is underway. If an investigation is selected both by NASA and by the mission sponsor, the investigator selected through this AO is responsible to NASA only for the scientific integrity and the management of his/her contribution to the mission.

Selection of a Mission of Opportunity investigation will generally result in the award of a contract, although NASA reserves the right to award a grant, or a cooperative agreement in

certain situations depending on the nature of the proposed activities. Further information on grants and cooperative agreements is contained in NASA Handbook NPG 5800.1D, entitled, *Grant and Cooperative Agreement Handbook*, available from the Mars Scout Library (see Appendix C).

Ordinarily, a selected Mission of Opportunity investigation will be expected to execute a Phase A Concept Study that NASA will subject to a detailed review. This study will conclude with a commitment by the U.S. PI for the cost, schedule, and scientific performance of the investigation, as well as the implementation of an appropriate E/PO program. If, at any time, this commitment appears to be in jeopardy, the investigation will be subject to cancellation regardless of the impact of this cancellation on its parent mission. Like other missions proposed to this AO, the NASA funding is subject to cancellation if there is a cost overrun charged to NASA for any reason, including a launch delay caused by the non-OSS partner. The MEP does not maintain a reserve pool from which investigations exceeding their cost commitments may draw.

Alternatively, NASA may select a Mars Scout Mission of Opportunity investigation for immediate implementation without the requirement for a Phase A Concept Study if NASA is satisfied with its readiness for development and implementation as proposed, and the schedule of its parent mission demands such immediate implementation. For such selection, a Mission of Opportunity proposal must still conform to this AO's guidelines for a Mission of Opportunity, including a commitment by the U.S. PI for the cost, schedule, scientific, and technical performance of the investigation with detail equivalent to that expected at the end of a Phase A Concept Study. In addition, the proposal must also be complete regarding the programmatic considerations outlined in Section 3.3. Investigations selected in this manner will be subject to the same conditions for cancellation as described in the preceding paragraph.

Regardless of whether a Phase A Concept Study is conducted or not, if the Mission of Opportunity involves the production of NASA-sponsored hardware, a technical and programmatic review will be held prior to the start of its production (i.e., Phase C/D). Assuming a positive outcome, NASA will confirm the investigation to proceed to development. As a condition for confirmation, the organization sponsoring the parent mission must make a commitment to enter into an appropriate agreement with NASA that shall include provisions for sharing of flight data (see further below in Section 5.3).

## **5.2 Launch Services**

Mars Scout Mission of Opportunity investigations are those conducted by a U.S. Principal Investigator through the flight of a non-OSS space mission. As a matter of NASA policy, sponsorship of a Mission of Opportunity investigation is always conducted on a no-exchange-of-funds basis with a non-U.S. mission sponsor. Under no condition will NASA pay for non-U.S. launch costs. For a Mission of Opportunity investigation on a U.S. commercial mission, the PI may receive funding that includes integration as well as launch services and will be responsible for payment of these costs through his/her proposed costs. Evaluation of the Mission of Opportunity investigations will not include an evaluation of the non-U.S. mission sponsored launch services, however, proposers should be aware that certain interface data are requested (see Appendix B).

## **5.3 Science Mission and Data Requirements**

Scout Mission of Opportunity investigations are required to only propose a Baseline mission investigation (performance floor definition is not required). Also, NASA recognizes that Mission of Opportunity investigation teams may justifiably incur data analysis responsibilities defined by the policies of the sponsor of the parent mission. Nevertheless, NASA expects that the mission sponsor will enter into an agreement with NASA to assure that science data is returned from at least those aspects of the mission in which NASA support is involved, if not the entire mission when such data is appropriate for MEP objectives, and these data must be made available to the U.S. scientific community in a timely way. NASA must conclude such an agreement with the mission sponsor in advance of launch.

In those cases where a Mission of Opportunity investigation proposes to simply purchase data from the parent mission, or to receive data in return for service as a member of a science team, it is understood that the proposal must provide evidence that such data as delivered will be suitable for successful completion of the proposed investigation.

## **5.4 Schedule and Cost Requirements**

### *5.4.1 Schedule*

It is incumbent on the proposing Mission of Opportunity investigator to provide evidence in his/her proposal that the sponsoring organization does intend to fund and implement the parent mission and that the endorsement by NASA for the proposed NASA-sponsored participation is required by that sponsoring organization prior to December 31, 2003. The launch date itself is not constrained, although it should not be substantially later than the end of 2007 in order to allow NASA's planning for the MEP to proceed in an orderly manner (see Section 2.2 above). If a commitment from NASA is not needed by the organization sponsoring the parent mission before December 31, 2003, then the proposal should be submitted to a subsequent MEP AO.



#### *5.4.2 NASA OSS Cost Requirements and Cost Caps*

The NASA OSS cost of a Mission of Opportunity investigation may not exceed \$25M for all phases of the investigation. Specific cost information required for proposals is contained in Appendix B. In addition, the total funding requirements for all Mars Scout Mission of Opportunity investigations selected through this AO must be compatible with the funding profile shown in the Appendix E except as noted. NASA funding for a selected investigation's Phase A Concept Study (if required; see Section 5.1) will be limited to \$250K, and this cost must be budgeted as a part of the initial proposal.

The PI assumes all risk for delays in the implementation of the parent mission and should propose appropriate reserves for such contingencies. Following the completion of any Phase A Concept Studies but prior to final selection by the parent mission's sponsoring organization, NASA funding for additional work will be limited to \$100K (in real year dollars). In any case, NASA funding for all work prior to the initiation of mission's detailed design (Phase C) will be limited to 25 percent of the total NASA commitment for the investigation.

Note that funding for Mission of Opportunity investigations must also include provisions for the planning and implementation of an appropriate E/PO program in accordance with OSS policies and guidelines.

During the Phase A Concept Study, the NASA OSS cost shall not increase by more than 20 percent from that offered in the original proposal to this AO and in any case must not exceed the NASA OSS cost cap for Mars Scout Missions of Opportunity. Thereafter, cost shall not increase from that offered in the proposal resulting from the Phase A Concept Study.

### **6.0 Proposal Preparation and Submission**

#### **6.1 Preproposal Activities**

##### *6.1.1 Mars Scout Library*

The Mars Scout Library shown in Appendix C provides additional background, technical, and management information and requirements. Information is included on the MEP science goals, Mars Technology Program, launch vehicles, Deep Space Network capabilities, Mars Telecommunications/Navigation Infrastructure Capabilities, planetary protection requirements, the MEP Public Engagement Plan, NASA's technology transfer infrastructure, the Office of Space Science's Integrated Technology Strategy, the Office of Space Science's Education and Public Outreach Strategy and Implementation, the Planetary Data System, and existing NASA test and mission operations facilities. In many cases the information provided in these reference documents includes examples of data that assist NASA's peer reviewers in better evaluating proposals. In any case of conflict between this AO and these documents, however, the AO takes precedence. All documents in this Library may be accessed through the World Wide Web at the URL <<http://centauri.larc.nasa.gov/mars/marslib.html>>. Note that hard copies are not available and should not be requested.

##### *6.1.2 Technical and Scientific Inquiries*

Inquiries about this AO may be directed to the Mars Program Scientist:

Dr. James Garvin  
Mars Scout 2002  
Solar System Exploration Division  
Code SE  
Office of Space Science  
National Aeronautics and Space  
Administration  
Washington, DC 20546-0001  
Telephone: (202) 358-1798  
E-mail [jgarvin@hq.nasa.gov](mailto:jgarvin@hq.nasa.gov)  
Facsimile: (202) 358-3098

### *6.1.3 Preproposal Conference*

A preproposal conference covering all types of proposals solicited by this AO will be held in the Washington, DC, area, beginning at approximately 8:30 a.m. on the date given in Section 1.3. Details regarding the PPC are posted at: <http://centauri.larc.nasa.gov/mars>.

All interested parties may attend but NASA funds may not be used in any way to defray the costs of attendance and they must make their own travel arrangements. The purpose of this conference will be to address questions about the proposal process for this AO. NASA personnel will address all those questions received no later than five days in advance of the conference; questions should be sent to the address given in Section 6.1.2. Additional questions submitted after this date, including those provided in writing at the conference, may be addressed at the conference only as time permits and if appropriate answers can be generated. Anonymity of the authors of all questions will be preserved. A transcript of the meeting, including answers to all questions addressed at the conference, will be posted as part of the Mars Scout Library discussed in Section 6.1.1 approximately two weeks after the conference. Additional questions and answers subsequent to the conference will also appear in this location if necessary.

### *6.1.4 Notice of Intent to Propose*

To assist NASA's planning of the proposal evaluation process, a Notice of Intent (NOI) to propose should be submitted by all prospective proposers in accordance with the schedule in Paragraph 1.2. Material in a NOI is for NASA planning purposes only and is confidential. Those submitting a NOI will directly receive any Mars Scout updates as may occur up to the time of proposal due date, although all updates will also be posted on the Website of this AO.

A NOI is to be submitted electronically by entering the requested information on the site for this AO at the World Wide Web address <http://proposals.hq.nasa.gov/>. Note: the specific site for the Mars Scout AO is found at the menu item Division Specific Opportunities, "OSS – Solar System Exploration".

Proposers who experience difficulty in using this site should contact the Help Desk by E-mail at [r-help@nasaprs.com](mailto:r-help@nasaprs.com).

To the extent known by the NOI due date, the proposer should be prepared to provide the following information:

- (a) Name, address, telephone number, fax number, E-mail address, and institutional affiliation of the Principal Investigator (PI).
- (b) Full names and institutional affiliations of each known Co-Investigator. If any Co-Investigators or other team members are from non-U.S. institutions, the mechanism by which these people expect to be funded should be identified in the comments box on the NOI form.
- (c) Type of proposal (Mars Scout Mission or Mars Scout Mission of Opportunity) and anticipated Launch Vehicle.
- (d) A brief statement (150 words or less) that covers the following topics:
  - (1) The scientific objectives of the proposed mission.
  - (2) New technologies that may be employed as part of the mission.
  - (3) The Education/Public Outreach objectives of the proposed investigation.
- (e) The name of the Lead Representative from each organization (industrial, academic, nonprofit, and/or Federal) included in the proposing team.

**SPECIAL NOTICE:** As a result of recent AO's for complete mission investigations such as this one, commercial aerospace and technology organizations have requested access to the names and addresses of those who submit NOI's in order to facilitate informing potential proposers of their services and/or products. Therefore, with the permission of the submitters of a NOI to this AO, NASA OSS is willing to make this information publicly available with the understanding that the Agency takes no responsibility for the subsequent use of such information. The Web site requesting NOI information allows the checking of a field that grants this permission. A list of those granting such permission will then be posted as an addendum at the Web site for this AO starting about one week after the NOI due date.

## **6.2 Format and Content of Proposals**

General NASA guidance for proposals to this AO is given in Appendix A, which is considered binding unless specifically amended in this AO. A uniform proposal format is required from all proposers to aid in proposal evaluation, which is provided in Appendix B. Failure to follow the provisions of this Appendix may result in reduced ratings during the evaluation process or could even lead to rejection of the proposal without review.

## 6.3 Submission Information

### *6.3.1 Certification and Commitment Signatures*

All proposals must have a Cover Page and Proposal Summary that is generated through a form that is accessible through the same Web site as that used for submission of a NOI (see Section 6.1.4 above) and then submitted electronically through the Web (see detailed instructions in Appendix B). Note that the authorizing institutional signature on the printout of the electronically submitted Cover Page also certifies that the proposing institution has read and is in compliance with the three required certifications printed in full in Appendix D; therefore, it is not necessary to separately submit these certifications with the proposal.

The proposal shall also include a letter of endorsement signed by an institutional official from every organization identified as providing no-exchange-of-funds contributions of hardware, software, facilities, and/or services (including those of Co-Investigators) that provides evidence that the institution and/or appropriate government officials are aware and supportive of the proposed investigation and will pursue funding if it is selected by NASA (see detailed instructions in Appendix B).

Signatures of commitment are required for all science team members identified in the science section (including the PI and Co-I's) and for all named key project personnel named elsewhere in the proposal including key individuals associated with the E/PO activities (see detailed instructions in Appendix B). The original documents with signatures must be included in the original copy of the proposal. Non-U.S. organizations involved in proposals must additionally submit such endorsements to:

Mars Scout 2002 AO  
Office of Space Science  
NASA Peer Review Services  
500 E Street, SW, Suite 200  
Washington, DC 20024-2760  
Tel: (202) 479-9030

no later than the due date given in the schedule in Section 1.2.

### *6.3.2 Quantity of Proposal Copies*

Forty-five (45) copies of each proposal, plus the original signed proposal and one zip disk or CD-ROM containing a searchable PDF version of the proposal must be delivered to the address in Section 6.3.3 on or before the proposal deadline given in Section 1.2.

### *6.3.3 Submittal Address*

All proposals must be received at the following address by the proposal due date given in Section 1.2:

Mars Scout 2002 AO  
Office of Space Science

NASA Peer Review Services  
500 E Street, SW, Suite 200  
Washington, DC 20024-2760  
Tel: (202) 479-9030

#### *6.3.4 Submission Schedule*

All proposals must be received at the address above by the closing date and time specified in Section 1.2. All proposals received after the closing date will be treated in accordance with NASA's provisions for late proposals (see Section VII, Appendix A).

#### *6.3.5 Notification of Receipt*

NASA will notify the proposers that their proposals have been received. Proposers not receiving this confirmation within two weeks after submittal of their proposals should contact the Mars Program Scientist at the address given in Section 6.1.2.

### **7.0 Proposal Evaluation, Selection, and Implementation**

#### **7.1 Evaluation and Categorization Processes**

All proposals submitted in response to this AO will be screened to determine their compliance to the constraints, requirements, and guidelines of this AO. Proposals not in compliance may be returned to the proposer without further review. Compliant proposals will be assessed against the criteria given in Section 7.2 by panels of individuals who are peers of the proposers. Panelists will be instructed to evaluate all proposals independently. These panels may be augmented through the solicitation of mail-in reviews that the panels will have the right to accept, in whole or in part, or reject. Proposers should be aware that during the evaluation and selection process, NASA may request the clarification of a specific point or points in a proposal; if so, such a request from NASA and the proposer's response shall be in writing.

An *Ad Hoc* Categorization Subcommittee of the Space Science Steering Committee (see further below), composed wholly of Civil Servants (some of whom may be from Government agencies other than NASA), will convene to consider the results of the peer reviews and categorize the proposals in accordance with procedures required by NFS Part 1872.403-1. These Categories are defined as follows:

Category I. Well conceived and scientifically and technically sound investigations pertinent to the goals of the program and the AO's objectives and offered by a competent investigator from an institution capable of supplying the necessary support to ensure that any essential flight hardware or other support can be delivered on time and that data can be properly reduced, analyzed, interpreted, and published in a reasonable time. Investigations in Category I are recommended for acceptance and normally will be displaced only by other Category I investigations.

Category II. Well-conceived and scientifically or technically sound investigations which are recommended for acceptance, but at a lower priority than Category I.

Category III. Scientifically or technically sound investigations which require further development. Category III investigations may be funded for development and may be reconsidered at a later time for the same or other opportunities.

Category IV. Proposed investigations which are recommended for rejection for the particular opportunity under consideration, whatever the reason.

The results of the evaluations and categorizations will then be reviewed by the Space Science Steering Committee (SSSC), which is composed wholly of NASA Civil Servants and appointed by the Associate Administrator for Space Science. The SSSC will conduct an independent assessment of the evaluation and categorization processes regarding both their compliance to established policies and practices, as well as the completeness, self-consistency, and adequacy of all materials related thereto. After this review, the final evaluation and categorization results will be forwarded to the Associate Administrator who will make the final selections. As the Selection Official, the Associate Administrator may consult with senior members of the Office of Space Science concerning the selections.

## **7.2 Evaluation Criteria**

The evaluation criteria below will be used to evaluate proposals as described in Section 7.1. For a Mars Scout Mission of Opportunity, the proposed investigation is understood to encompass only the proposed contribution to the mission and not that of the entire parent mission. The evaluation criteria (which are defined more fully in subsections below) are as follows:

- The scientific merit of the proposed investigation;
- The technical merit and feasibility of the proposed investigation; and
- The feasibility of the proposed approach for mission implementation, including cost risk.

The proposal categorizations, discussed in Section 7.1 above, will be based only on these criteria, all of which are of approximately equal weight. For Missions of Opportunity proposals that do not involve the provision of NASA-sponsored hardware, the third criterion is not invoked, and the remaining first two criteria are of approximately equal weight.

### *7.2.1 Scientific Merit of the Investigation*

The science information provided in the proposal will be used to evaluate its intrinsic scientific merit as expressed in terms of specific major and minor Strengths and Weaknesses. The investigation's goals and objectives will be compared with the latest recommendations of the Mars science community (i.e., MEPAG priorities and those recommended to NASA by the NRC COMPLEX) to determine its potential scientific impact and relationship to the other approved elements of NASA's Mars Exploration Program (also see Section 2). This evaluation will include how well the investigation promises fundamental progress in our knowledge about Mars relative to the current state of the art, how well the mission may support ongoing or planned Mars missions, and whether or not it may also provide ancillary benefits to NASA's space science program in general (e.g., through the development and demonstration of critical new technologies that enable new types of scientific observations). For Mars Scout Mission investigations, the scientific value of the Performance Floor (see Section 4.2) will also be assessed as part of the determination of the overall scientific merit of the investigation. This

evaluation will result in narrative text as well as an adjectival score of the scientific merit of the investigation.

### *7.2.2 Technical Merit and Feasibility of the Investigation*

Each investigation will be evaluated for its technical merit, feasibility, resiliency, and the probability of success as expressed in terms of specific major and minor Strengths and Weaknesses. Technical merit and feasibility will be evaluated by assessing the degree to which the investigation will address the proposed scientific goals and objectives, and the degree to which any proposed instruments can provide the necessary data. Considerations in the evaluation of the data analysis (i.e., calibration/validation) and archiving plan will include an assessment of planning and budget adequacy and evidence of plans for well-documented, high level products and software usable to the entire science community and consideration of adequate resources for physical interpretation of data and reporting scientific results in refereed journals. Consideration of whether the data gathered will be sufficient to complete the scientific investigation will be a major factor in this assessment, as will the proposed plan for the timely release of the data to the public domain for enlarging its science impact. For Mars Scout Mission investigations, resiliency will be evaluated by assessing the approach to descoping the Baseline Mission to the Performance Floor in the event that development problems force reductions in scope. The probability of success will be evaluated by assessing the experience, expertise, and organizational structure of the science team and the mission design in light of any proposed instruments. The role of each Co-Investigator will also be evaluated for necessary contributions to the proposed investigation, and the inclusion of Co-I's who do not have a well-defined role may be cause for downgrading of the proposal. This evaluation will result in narrative text as well as appropriate adjectival ratings for the technical merit and feasibility of the scientific investigation.

Mission of Opportunity investigations that do not include hardware (e.g., data purchase or data exchange for services as a Co-I) will be evaluated against all the factors above except that the non-NASA provided flight instrument design(s) will not be evaluated for its(their) ability to provide the necessary data. However, such proposals will be evaluated for the evidence that such data will be made available by way of signed commitments for their delivery in a format and time frame suitable for the completion of the proposed investigation

### *7.2.3 Feasibility of the Mission Implementation, Including Cost Risk*

The over arching metric for this criterion is implementation risk, which has a number of dimensions. These considerations apply only to Mars Scout Mission investigations.

For proposals that require new technologies/advanced developments, i.e., technologies having a Technology Readiness Level (TRL) less than 7 (see TRL Definitions in Mars Scout Library Appendix C), the requirement for new technologies and/or advanced development will clearly be one driver of the assessment of mission implementation risk. (Note that specific guidelines for discussing the utilization of such technologies/advanced developments are given in Appendix B.)

The technical and management approaches will be evaluated to assess the likelihood that the investigation can be implemented as proposed and on the schedule requiring launch by the end of 2007, including an assessment of the risk of completing the investigation within the proposed cost. This evaluation will consider implementation factors such as the proposed launch vehicle, including reliability, the overall mission design (i.e., mission "architecture"), spacecraft design, and design margins; the use of the Mars infrastructure and DSN in general; and the proposer's understanding of the processes, products, and activities required to accomplish development and integration of all elements (flight systems, ground and data systems, etc.). This assessment will also consider the adequacy of the proposed approach to ensure success, involving such factors as the organizational structure, the roles and experience of any identified partners, the management approach, the commitments of partners and contributors, and the team's understanding of the scope of work (covering all elements of the mission, including contributions). The relationship of the work to the project schedule, the project element interdependencies, and associated schedule margins will also be evaluated, as will the proposal's discussion of the methods and rationale (e.g., cost models, cost estimating relationships of analogous missions, etc.) used to develop the estimated cost and cost risks. Innovative cost effective features, processes, or approaches will be rewarded if proven sound.

It is recognized that teaming arrangements for implementing a proposed investigation may not be complete before the proposal closing date. Therefore, proposers will not be penalized if the proposal indicates only candidate (but credible) implementation approaches for the spacecraft, the launch vehicle, communications networks, and ground systems that will allow successful implementation of the mission.

Since by definition Mission of Opportunity investigations are carried out through non-OSS missions, factors involving spacecraft and launch vehicle capabilities will be considered in the evaluation only as appropriate. Mission of Opportunity investigations that do not provide hardware (e.g., data buys or data exchange for Co-I services) are not evaluated under this criterion.

For both Scout Missions and Mission of Opportunity investigations, technical, management and cost evaluation will include an assessment of proposed planetary protection provisions to avoid potential biological contamination (forward and backward) associated with the mission.

Based on the items described above, each proposal will be evaluated and rated as either Low, Medium, or High Risk, as substantiated by appropriate narrative text.



### **7.3 Selection Process**

The results of the proposal evaluations based on the criteria above and their subsequent categorizations will be forwarded through the Space Science Steering Committee to the OSS Associate Administrator for consideration in the selection process. The proposed cost to NASA OSS will be a major factor to be considered for the final selections as will be the proposed commitment to the program factors discussed in Section 3.3.

Regarding the final selections, proposers should recognize that the Associate Administrator is free to use a wide range of planning and policy considerations when selecting among top-rated proposals. In addition, while OSS develops its program strategy in close consultation with the science community through a wide variety of advisory and working groups, the OSS program is an evolving activity that is ultimately dependent upon the President's policies and budgets, as well as MEP objectives and priorities that can change quickly in time based on, among other things, new discoveries from the ongoing Mars missions.

The overriding consideration for the final selection of proposals submitted in response to this AO will be to maximize scientific return within the available Mars Scout budget. Depending on the availability of proposals of appropriate merit, this objective may be achieved by the selection of investigations at the cost ceiling for a single Mars Scout Mission investigation, or a combination of lower cost Mission investigations, including a Mission(s) of Opportunity.

### **7.4 Implementation Activities**

#### *7.4.1 Notification of Selection and Nonselection*

Following selection, the PI's of the selected investigations will be notified immediately by telephone, followed by formal written notification (to both the PI and the institution(s) responsible) that will include instructions for scheduling a debriefing at which time any issues identified during the evaluation that may require attention during the Phase A Concept Study will be pointed out. In addition, any other special instructions for the Concept Study will be communicated.

Proposers of investigations that were not selected will be notified in writing and offered oral debriefings for themselves and a representative from each of their main partners (if any). Such debriefings may be in person at NASA Headquarters or by telephone at the discretion of the proposer. In the former case, NASA funds may not be used to defray travel costs by the proposer for the debriefing. In either case, along with the proposing Principal Investigator, a senior representative from the key institution(s) of the proposal may also participate in such debriefings.

#### 7.4.2 *Contract Administration and Funding*

In accordance with NASA's assignment of oversight management responsibility to its Centers, Mars Scout oversight management responsibilities have been assigned to the Mars Program Office (MPO) located at the Jet Propulsion Laboratory. The responsibilities of the MPO Mars Scout Manager will include oversight of the mission implementation, coordination of Government-furnished services, equipment and facilities, and contract management of selected investigations. In addition, the MPO will conduct independent reviews coincident with the major project reviews, such as Preliminary Design Review or the Critical Design Review.

The unique mission management approaches and organizational arrangements in the selected proposals may require varying contract administration and funding arrangements. Therefore, each PI should specify the proposed teaming arrangement in his/her proposal including any special contracting mechanisms that are considered especially desirable for NASA's awards to the team. In this regard, NASA strongly encourages the use of incentives when cost-type contracts, particularly where performance incentives are measured based on delivery of calibrated/validated science data products.

It is anticipated that NASA will provide up to \$500K to each selected Mars Scout Mission investigation and up to \$250K for each Mission of Opportunity investigation (if applicable; see Section 5.1) to perform a six-month Phase A Concept Study to be initiated as soon as possible after notification.

#### 7.4.3 *Confirmation of Investigation(s) for Implementation*

The product of the Phase A studies will be Concept Study reports from each selected investigation as specified in the document entitled *Guidelines For Phase A Concept Study Report Preparation* in the Mars Scout Library (see Appendix C). The criteria for evaluating the Phase A Concept Study are described in the document entitled *Guidelines and Criteria for the Phase A Concept Study* found in the Mars Scout Library. The scientific, technical, management, cost, and other aspects of the Phase A Concept Study will be assessed by a panel composed of individuals who are experts in each of the areas to be evaluated and will be similar to the evaluation of the original proposal, but will consider the additional detailed information that has been requested. In addition, there will be a detailed evaluation of E/PO, Technology Infusion/Transfer, and small disadvantaged business plans that are expected to be developed as part of the Phase A Concept Study. NASA routinely requests in-person presentations and/or site visits to review the Phase A Concept Study results with the investigation teams.

As a result of the evaluation of the Concept studies, the NASA Associate Administrator for Space Science may confirm one or more Mars Scout investigations to proceed to Phase B. NASA will not continue funding for investigations that are not selected to proceed, although they are free to compete in future appropriate OSS solicitations.

#### *7.4.4 Confirmation of Investigations for Phases Subsequent to Phase A*

At the completion of the Phase B (i.e., after the Preliminary Design Review) for the selected and confirmed investigations, an independent review team, chartered by the Associate Administrator for Space Science, will conduct a Confirmation Assessment, the results of which will be presented to the Associate Administrator in a formal Confirmation Review (CR). This activity constitutes the NPG 7120.5A Approval process, which will then decide whether or not to confirm the mission for implementation (Phase C/D). Any investigation not approved for implementation may be funded for further study or its contract may be terminated. No more funds will be expended on nonconfirmed and terminated investigations, although they may be repropose to future appropriate OSS solicitations.

## **8.0 Conclusion**

The Mars Scout represents a challenging new opportunity for NASA to accomplish the scientific exploration of Mars through relatively low-cost flight missions investigations, as well as to enhance education initiatives and engage the public in the excitement of space science. NASA invites both the U.S. and international science communities to submit proposals for Mars Scout Mission investigations and Mission of Opportunity investigations solicited by this Announcement of Opportunity.

Orlando Figueroa  
Director  
Mars Exploration Program Office

Colleen N. Hartman  
Director  
Solar System Exploration Division

Edward J. Weiler  
Associate Administrator  
for Space Science

## APPENDIX A

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### GENERAL INSTRUCTIONS AND PROVISIONS

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#### I. INSTRUMENTATION AND/OR GROUND EQUIPMENT

By submitting a proposal, the investigator and institution agree that NASA has the option to accept all or part of the offeror's plan to provide the instrumentation or ground support equipment required for the investigation, or NASA may furnish or obtain such instrumentation or equipment from any other source as determined by the selecting official. In addition, NASA reserves the right to require use of Government instrumentation or property that subsequently becomes available, with or without modification, that meets the investigative objectives.

**NOTICE TO ALL OFFERORS:** In the event that a Principal Investigator employed by NASA is selected under this Announcement of Opportunity (AO), NASA will award prime contracts to non-Government participants, including co-investigators, hardware fabricators, and service providers, who are named members of the proposing team, as long as the selecting official specifically designates the participant(s) in the selection decision. Refer to Section I of Appendix B of this AO for proposal information which the selecting official will review in determining whether to incorporate a non-Government participant in the selection decision. Each NASA contract with hardware fabricators and service providers selected in this manner will be supported by an appropriate justification for other than full and open competition, as necessary.

#### II. TENTATIVE SELECTIONS, PHASED DEVELOPMENT, PARTIAL SELECTIONS, AND PARTICIPATION WITH OTHERS

By submitting a proposal, the investigator and the organization agree that NASA has the option to make a tentative selection pending a successful feasibility or definition effort. NASA has the option to contract in phases for a proposed experiment, and to discontinue the investigative effort at the completion of any phase. NASA may desire to select only a portion of the proposed investigation and/or that the individual participates with other investigators in a joint investigation. In this case, the investigator will be given the opportunity to accept or decline such partial acceptance or participation with other investigators prior to a NASA selection. Where participation with other investigators as a team is agreed to, one of the team members will normally be designated as its leader or contact point. NASA reserves the right not to make an award or cancel this AO at any time.

#### III. SELECTION WITHOUT DISCUSSION

The Government intends to evaluate proposals and award contracts without discussions with offerors. Therefore, each initial offer should contain the offeror's best terms from a cost or price and technical standpoint. However, the Government reserves the right to conduct discussions, if later determined by the Contracting Officer to be necessary.

#### IV. NONDOMESTIC PROPOSALS

The guidelines for proposals originating outside of the United States are the same as those for proposals originating within the United States, except that the additional conditions described in Sections 3.9 shall also apply.

#### V. TREATMENT OF PROPOSAL DATA

It is NASA policy to use information contained in proposals and quotations for evaluation purposes only. While this policy does not require that the proposal or quotation bear a restrictive notice, offerors or quoters should, in order to maximize protection of trade secrets or other information that is commercial or financial and confidential or privileged, place the following notice on the title page of the proposal or quotation and specify the information, subject to the notice by inserting appropriate identification, such as page numbers, in the notice. In any event, information (data) contained in proposals and quotations will be protected to the extent permitted by law, but NASA assumes no liability for use and disclosure of information not made subject to the notice. To prevent inadvertent disclosure, proposal data should not be included in submissions (e.g., final reports) that are routinely released to the public.

##### RESTRICTION ON USE AND DISCLOSURE OF PROPOSAL AND QUOTATION INFORMATION (DATA)

The information (data) contained in (insert page numbers or other identification) of this proposal or quotation constitutes a trade secret and/or information that is commercial or financial and confidential or privileged. It is furnished to the Government in confidence with the understanding that it will not, without permission of the offeror, be used or disclosed for other than evaluation purposes; provided, however, that in the event a contract is awarded on the basis of this proposal or quotation, the Government shall have the right to use and disclose this information (data) to the extent provided in the contract. This restriction does not limit the Government's right to use or disclose this information (data), if obtained from another source without restriction.

#### VI. STATUS OF COST PROPOSALS

Submission of a Standard Form (SF) 1411 Contract Pricing Proposal Cover Sheet for the Phase A Concept Study is not required. The SF 1411 is required for all contract options after the Phase A Concept Study. The investigator's institution agrees that the cost proposal submitted in response to the Announcement is for proposal evaluation and selection purposes, and that, following selection and during negotiations leading to a definitive contract, the institution may be required to resubmit or execute all certifications and representations required by law and regulation.

## VII. LATE PROPOSALS

The Government reserves the right to consider proposals or modifications thereof received after the date indicated for such purpose, if the selecting official deems it to offer NASA a significant technical advantage or cost reduction. (See NFS 18-15.208.)

## VIII. SOURCE OF SPACE INVESTIGATIONS

Investigators are advised that candidate investigations for space missions can come from many sources. These sources include those selected through the AO, those generated by NASA in-house research and development, and those derived from contracts and other agreements between NASA and external entities.

## IX. DISCLOSURE OF PROPOSALS OUTSIDE THE GOVERNMENT

NASA may find it necessary to obtain proposal evaluation assistance outside the Government. Where NASA determines it is necessary to disclose a proposal outside the Government for evaluation purposes, arrangements will be made with the evaluator for appropriate handling of the proposal information. Therefore, by submitting a proposal, the investigator and institution agree that NASA may have the proposal evaluated outside the Government. If the investigator or institution desires to preclude NASA from using an outside evaluation, the investigator or institution should so indicate on the cover. However, notice is given that if NASA is precluded from using outside evaluation, it may be unable to consider the proposal.

## X. EQUAL OPPORTUNITY

For any NASA contract resulting from this solicitation, the clause at FAR 52.222-26, Equal Opportunity, shall apply.

## XI. PATENT RIGHTS

- A. For any NASA contract resulting from this solicitation awarded to other than a small business firm or nonprofit organization, the clause at NFS 18-52.227-70, New Technology, shall apply. Such contractors may, in advance of a contract, request waiver of rights as set forth in the provision at NFS 18-52.227-71, Requests for Waiver of Rights to Inventions.
- B. For any NASA contract resulting from this solicitation awarded to a small business firm or nonprofit organization, the clause at FAR 52.227-11, Patent Rights--Retention by the Contractor (Short Form) (as modified by NFS 18-52.227-11), shall apply.

## **XII. RIGHTS IN DATA**

Any contract resulting from this solicitation will contain the Rights in Data - General clause: FAR 52.227-14.

## **XIII. SMALL AND SMALL DISADVANTAGED BUSINESS SUBCONTRACTING**

A. Offerors are advised that, in keeping with Congressionally mandated goals, NASA seeks to place a fair portion of its contract dollars, where feasible, with small disadvantaged business concerns, women-owned small business concerns, Historically Black Colleges and Universities, and minority educational institutions, as these entities are defined in 52.219-8 and in 52.226-2 of the FAR. In conjunction with the Phase A Concept Study, the offeror's subcontracting plan will be evaluated on the participation goals and quality and level of work performed by small disadvantaged business concerns, women-owned small business concerns, Historically Black Colleges and Universities, and other minority educational institutions. Offerors will be evaluated on the participation in the performance of the mission of small disadvantaged business concerns in the authorized Standard Industrial Classification (SIC) Groups as determined by the Department of Commerce (see FAR 19.201 (b)), as well as the participation of women-owned small business concerns, HBCU's and OMI's.

B. Offerors are advised that for NASA contracts resulting from this solicitation that offer subcontracting possibilities, exceed \$500,000, and are with organizations other than small business concerns, the clause FAR 52.219-9 shall apply. Offerors whose investigations are selected under this AO will be required to negotiate subcontracting plans which include subcontracting goals for small, small disadvantaged, women-owned, veteran-owned, and HUB Zone small business concerns. Note that these specific subcontracting goals differ from the goals described in paragraph A above, and need not be submitted with the proposal. Failure to submit and negotiate a subcontracting plan after selection shall make the offeror ineligible for award of a contract.

## APPENDIX B

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### GUIDELINES FOR PROPOSAL PREPARATION

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The following guidelines apply to the preparation of proposals in response to this AO. The material presented is a guide for the prospective proposer and is not intended to be all encompassing. The proposer must, however, provide information relative to those items applicable, as well as other items required by the AO. In the event of an apparent conflict between the guidelines in this Appendix and those contained within the body of the AO, those within the AO shall take precedence.

#### GENERAL GUIDELINES

All documents must be typewritten in English, use metric and standard astronomical units, and be clearly legible. Submission of proposal material by facsimile, electronic media, videotape, or computer disk (except as noted in Section H, below), is not acceptable, nor may a proposal reference a World Wide Web site for any data or material necessary for its completeness or review. In evaluating proposals, NASA will only consider the printed material in the submitted proposal excepted as noted in Section H.

The proposal must consist of only one volume, with readily identified sections corresponding to Sections D through I given below in this Appendix. The restrictions on page count for the various sections are specified in the table below. If the same information is required in more than one section of the proposal (e.g., instrument and/or spacecraft design specifications) to support the subject discussion, it may be included by reference to the primary section where it exists provided that such reference does not unduly impede understanding of the presented material.

In order to allow for recycling of proposals after the review process, all proposals and copies must be submitted on plain white paper only (i.e., no cardboard stock or plastic covers, no colored paper, etc.). Photographs and color figures are permitted only if printed on recyclable white paper. The original, signed copy of the proposal (including signed endorsements) must be bound in a manner that makes it easy to disassemble for reproduction should NASA need additional copies. Except for the original, two-sided copies are preferred.

Proposals shall comply with the page limitations noted in the table below, including no more than five fold out pages (28 x 43 cm; i.e., 11 x 17 inches), where each fold out page counts as two regular sized pages. All pages other than fold out pages shall be 8.5 x 11 inches or A4 European standard. Each side of paper on which text or figures appears is counted as a page.

Single- or double-column printing format is acceptable. In complying with the page limits, the type font should not be smaller than 12-point (i.e., less than or equal to ~15 characters per inch). For 8.5 x 11 paper use 1 inch margin all around; for A4 paper use 2.5 cm margins at top and both sides and 4 cm at the bottom. Figure captions should be in 12 point font, though smaller font is allowed within figures and in the cost table, however, all must be easily readable without optical aid. To assist in the evaluation process, one zip disk or CD-ROM containing a searchable PDF version of the proposal is required.



The following table provides page count limits within the proposal:

<b>Section</b>	<b>Page Limit</b>
A. Cover Page and Proposal Summary	Printout of electronic Web submission
B. Table of Contents	2
C. Fact Sheet	2
D. Science Investigation	25
E. Plan for Education and Public Outreach, Technology Infusion/Transfer, and Small Disadvantaged Businesses	2
F. Mission Implementation including Advanced Development G. Management and Schedule H. Cost and Cost Estimating Methodology Note: Cost tables do not count against page limits.	20 (plus 5 pages if development of advanced technologies is proposed)
I. Appendices: (no others permitted) 1. Statement(s) of Work (SOW) for each contract 2. Letter(s) of Endorsement and Commitment 3. Resumes (signed by each participant) 4. Draft International Participation Plan - Discussion of Compliance with U.S. Export Laws and Regulations 5. Draft Outline of Technical Responsibilities (if international participation is involved) 6. Planetary Protection Compliance. 7. Compliance with Federal Procurement Regulations for NASA PI 8. Proposals Acronyms / Abbreviations 9. Reference List (optional)	No page limit, but small size encouraged

#### A. COVER PAGE AND PROPOSAL SUMMARY

A Cover Page and Proposal Summary, prepared as directed below, must preface the proposal. The Cover Page must be signed by the Principal Investigator and an official of the proposing organization who is authorized to commit the organization's resources to the proposed investigation. This authorizing signature also certifies that the proposing institution has read and is in compliance with the three required certifications printed in full in Appendix D; therefore, these certifications do not need to be submitted separately.

The form for the Cover Page and Proposal Summary is found at the WWW site located at <http://proposals.hq.nasa.gov> and must be submitted electronically to that same site after it is filled out. (Note that the specific site for this AO is found at the menu item Division Specific

Opportunities, "OSS – Solar System Exploration." The full names of the Principal Investigator and the authorizing official, their addresses with zip code, telephone and fax numbers, and electronic mail addresses, are required on the specified form, as well as the names, institutions, and E-mail addresses of all participants, the type of investigation proposed, the total NASA OSS Cost, and a 200-word Proposal Summary. A hard copy version of this Cover Page/Proposal Summary must be printed in time to acquire signatures and include with the original hard copy of the proposal for delivery to the address in Section 6.3.3 according to the schedule provided in Section 1.3, both in this AO. Proposers are advised that they must not reformat or correct the printed version of this Cover Page as important NASA-required documentation may be lost. Proposers who experience difficulty in using this site may contact the Help Desk at [r-help@nasaprs.com](mailto:help@nasaprs.com) for assistance. Note that electronic submission of the Cover Page does not satisfy the deadline for proposal submission.

It is NASA's intent to enter the Proposal Summaries of all selected investigations for its various programs into a publicly accessible database. Therefore, the Proposal Summary should not contain any proprietary or confidential information that the submitter wishes to protect from public disclosure; in that regard, see also Section V of Appendix A of this AO.

## B. TABLE OF CONTENTS

The proposal should contain a Table of Contents that parallels the topics below in Sections D through I.

## C. FACT SHEET

A Fact Sheet that provides a brief summary of the proposed investigation must be included in the proposal. The information conveyed on the Fact Sheet should include the following:

- Science objectives (including the importance of the science to the NASA science themes);
- Education and public outreach objectives (including synergy with the MEP);
- Technology development/infusion/transfer objectives;
- Mission overview (including mission objectives and major mission characteristics);
- Science payload;
- Key spacecraft characteristics;
- Anticipated launch vehicle;
- Mars and DSN infrastructure usage;
- Mission management (including teaming arrangement as known);
- Anticipated need for curatorial services for returned samples as applicable;
- Schedule of proposed investigation;
- Statement of any anticipated significant non-NASA OSS contributions to the investigation and an estimate of their value; and
- The estimated Total Cost to NASA from Table B-1.

Other relevant information, including figures or drawings, may be included at the proposer's discretion, but the Fact Sheet is restricted to two pages (preferably a single, double-sided sheet).

## D. SCIENCE INVESTIGATION

The Science Investigation section should contain the following topics for the proposed investigation.

1. Scientific Goals and Objectives. This section should consist of a discussion of the goals and objectives of the investigation with respect to the MEP measurements and objectives and their relationships to past, current, and future Mars investigations and missions as may be known. It should describe the history and basis for the proposed investigation and its perceived value to NASA's MEP.

The measurements to be taken in the course of the investigation, the data to be returned, and the approach that will be taken in analyzing the data to achieve the scientific objectives of the investigation should be discussed. This description should identify the investigation to be performed, the quality of the data to be returned (e.g., resolution, coverage, pointing accuracy, measurement precision, etc.), and the quantity of data to be returned (bits, images, etc.). The relationship between the data products generated and the scientific objectives should be explicitly described, as should the expected results. It is assumed that the above information will constitute the Baseline Mission.

A single Performance Floor, defined as the minimum acceptable data and scientific return, must be defined for the mission investigation below which it would not be worth pursuing. The value of an investigation carried out at the level of the Performance Floor should be discussed. A description of the descope options available, their phasing, and their effect on meeting the scientific objectives of the investigation as it is descope from the Baseline to the Performance Floor should be discussed.

2. Implementation.
  - a. Instrumentation. This section should describe the proposed instrumentation and the criteria used for its selection. It should identify the individual instruments and instrument systems, including their characteristics and requirements. It should indicate items which are proposed to be developed, as well as any existing instrumentation or design/flight heritage. The quality and quantity of data generated by each instrument as they relate to the stated science investigation goals and objectives should be discussed. The flow-down from science investigation goals to measurement objectives to instrument performance should be stated clearly and supported by analysis where possible.

A preliminary description of each instrument design with at least a block diagram showing the instrument systems and their interfaces should be included, along with a presentation of the estimated performance of the instrument. These performance characteristics (which shall be considered as requirements on the flight system) should include mass, power, volume, data rate(s), pointing, and pointing accuracy, as well as resolution, precision/sensitivity, and calibration requirements.

- b. Mission. The science payload observing profile should be discussed, including all mission-relevant parameters, such as orbit and/or surface location, pointing requirements, operational time lines (including observing periods, data transmission periods and techniques, including use of elements of the Mars infrastructure, and time-critical events), etc. The manner in which the stated investigation objectives and selected instruments drive the proposed mission design and operations plan should be apparent from this discussion.
- c. Data Analysis and Archiving. The data reduction and analysis activities after the data have been delivered to the ground should be discussed, including the method and format for data reduction, data validation, and preliminary analysis. The process by which data will be prepared for archiving should be discussed, including a list of the specific data products to be produced and the individual team members responsible for this activity. The plan must include a detailed schedule for the submission of raw and reduced data to the NASA PDS in the proper formats, media, etc. Delivery of the data to the data archive must take place in the shortest time possible.
- d. Science Team. This section must identify every individual that is considered necessary for the investigation science team and their roles and responsibilities. The capabilities and experience of all members of the proposed science team must be described (Note: signed resumes of team members must be included as attachments to the proposal; see Section I below). The role of each CoInvestigator must be explicitly defined and justified, and the funding source (NASA or contributed) must be specified for the PI and each Co-Investigator. If a Co-Investigator's services are contributed at no cost to the investigation, a letter of endorsement is required from that Co-I's institution (see Section I.2 below).

## E. EDUCATION/PUBLIC OUTREACH, TECHNOLOGY INFUSION/TRANSFER, AND SMALL DISADVANTAGED BUSINESSES

The proposer must provide a statement that she/he understands NASA OSS and MEP requirements for Education and Public Outreach (E/PO) and is committed to carrying out an E/PO program that meets the goals described in Section 3.3 of the AO. The proposer must also provide a brief overview of the planned E/PO activities and their relationship to the proposed investigation including the synergy expected with MEP E/PO efforts. This overview should include a brief discussion of any unique characteristics of the mission that might provide unusual opportunities for E/PO. Detailed plans for implementing the E/PO activities, including identification of and formal commitment from E/PO partner institutions, will be provided in conjunction with the Phase A Concept Study and will be evaluated as part of the confirmation process.

The proposer must provide a statement that she/he understands NASA OSS goals for new/advanced technology transfer and intends to address these goals. Details of the plans for addressing these goals will be provided in conjunction with the Phase A Concept Study and will be evaluated as part of the confirmation process.

The proposer must provide a statement that she/he understands NASA OSS requirements for participation of Small Disadvantaged Businesses and Minority Institutions and intends to comply with these requirements. Details of the plans for addressing these requirements will be provided in conjunction with the Phase A Concept Study and will be evaluated as part of the confirmation process.

## F. MISSION IMPLEMENTATION

This section should provide a description of the space flight mission through which the investigation is to be executed, including mission design, instrument accommodation, spacecraft, required launch vehicle, ground systems, communications approach (including usage of Mars and DSN infrastructure), and mission operations plan. Specific information should be included that describes the unique requirements placed on these mission elements by the science investigation. In some areas (for example, instruments), the data requested may already be needed and presented in another section of the proposal (e.g.; the Science Implementation section). In such cases, proposers may provide a reference to that(those) section(s) and need not repeat the data in this section.

Within this section describe the development approach that will assure mission success. Include the following items to the degree they are known:

- Heritage and maturity of mission elements (instruments, spacecraft, ground systems, and mission design, etc.) including plans for adapting inherited hardware/software to the proposed mission, as well as the level of development of inherited hardware/software;
- Approach to the use or nonuse of redundancy and other reliability measures;
- Requirements for burn-in of parts and total operating test time required without failure prior to flight;
- Assembly, integration, and test flows and integration and test approach;

- Environmental test philosophy (test flow and sequence, test margins, and test durations);
- Product and mission assurance activities;
- Systems engineering and trade studies (planned and/or completed);
- Potential risks to the proposed mission activities and plans for mitigating those risks;
- Advanced development plans (new technology) for producing flight qualified hardware/software, including the strategy for bringing advanced development to flight qualification by PDR and/or backup plans should the advanced development fail to produce adequate maturity for flight;
- Strategy for the management of onboard resources including propellant;
- Planetary protection implementation (forward contamination control and back contamination prevention, if applicable);
- Usage of Mars infrastructure assets (e.g., telemetry relay); and
- DSN infrastructure usage including:
  - Direct-to-Earth Links
  - Relay Links
- Other Communication and Systems Parameters enumerated in *NASA's Mission Operations and Communications Services* document (see Mars Scout Library, Appendix C)

It is recognized that teaming arrangements to implement the investigation may not be complete at the time of the proposal. Proposers will not be penalized for this if it is demonstrated that there are candidate implementation approaches for the spacecraft, launch vehicle, communications, and ground systems that may reasonably be expected to allow the successful implementation of the investigation within the proposed cost and schedule.

Although the maturity of the proposed design may require the results of later trades during the Phase A Concept Study, in addition to the information above, the specific data identified below should be provided (preferably in tables) to the extent known at the time the proposal is due and as applicable to the proposed mission configuration.

#### 1. General information.

- Baseline launch date and launch window;
- Launch energy (C3) required for baseline launch window;
- Mission duration (cruise, science, total);
- Date/Time of Mars Orbit Insertion (MOI; as applicable);
- Orbit type (as applicable);
- Orbit parameters for all science mission phases (semi-major axis, eccentricity, inclination, node time of day, argument of perigee, altitude);
- Epoch time in Gregorian date and duration of each science mission phase (e.g; different orbits, flybys, etc.) corresponding to information above;
- Nonplanetary target (e.g.; Phobos and Demos) orbital elements and gravitational constants; and
- Earth-Spacecraft Distance (range) for each major event (MOI, flybys, Trajectory Maneuver's, etc.).

#### 2. Downlink Information.

- Communications System Parameters and other information (see *NASA's Mission Operations and Communications Services* document in the Mars Scout Library, Appendix C for data required for Deep Space Network and commercial downlink options).
- Data rate and volume (kbps, Mbytes/day),
- Data Rate and Data Volume per Day on Direct-to-Earth Link;
- Data Rate and Data Volume per Day on Relay Link (if any);
- Bit error rate and onboard storage (Mbytes);
- Power available for communications (Watts)
- Number of data dumps per day and whether the data dumps utilize the DSN and/or the Mars telecommunications/navigation infrastructure (e.g., Mars orbiters with surface and near-surface data relay capability);
- Science data destination (e.g., a science operations center); and
- Maximum time lag between data dump and data arrival at destination if relevant to science needs.

3. Uplink Information.

- Communications Systems Parameters and other Information requested in *NASA's Mission Operations and Communications Services* document in the Mars Scout Library/Appendix C including data required for Deep Space Network and commercial uplink options;
- Number of uplinks needed per day;
- Number of bytes per uplink;
- Anticipated use of DSN and/or Mars telecommunications/navigation infrastructure; and
- Approach and schedule for obtaining license(s) for use of proposed frequency bands.

4. Provision of critical event data. Critical events are defined as events that could result in the loss of the mission if anomalies occur (i.e., orbit insertion, entry/descent/landing, etc.), and telemetry is required for mission critical events to allow the cause of loss of mission to be determined. The approach and plans for how such data are to be measured and returned must be discussed.

5. Contingencies and Margins. Using the definitions in the table below,

- For the combined instrument payload and spacecraft, provide estimates of the contingencies and margins for mass, power, and fuels at both the subsystem and system levels.
- For the instrument payload alone, provide the contingencies and margins for the requirements on the spacecraft, e.g., pointing accuracy, stability, attitude, and maneuvering, necessary for science operations (include design margins, when known).

### Definitions of Contingency and Margin

Contingency (or reserve), when added to a resource, results in the maximum expected value for that resource. Percent contingency is the value of the contingency divided by the value of the resource less the contingency.

Margin is the difference between the maximum possible value of a resource (the physical limit or the agreed-to limit) and the maximum expected value for a resource. Percent margin for a resource is the available margin divided by its maximum expected value.

Example: A payload in the design phase has a currently estimated mass of 115 kg, including a mass reserve of 15 kg. There is no other payload on the ELV and the ELV provider plans to allot the full capability of the vehicle, if needed. The ELV capability is 200 kg. The mass reserve is  $15/(115-15) = 15\%$ , and the mass margin is 85 kg or  $85/115 = 74\%$ .

Example: The end-of-mission life capability of a spacecraft power system is 200 Watts. The proposed instrument is expected to use 40 Watts, and a 25% contingency is planned. If 75 watts is allotted by the satellite provider, the reserve is  $(.25 \times 40) = 10$  Watts while the margin is  $75 - (40 + 10) = 25$  Watts, or  $25/50 = 50\%$ .

Using the term contingency equivalently to the term reserve, and acknowledging that the maximum expected resource value is equal to the maximum proposed resource value (including contingency), the above technical terms can be expressed in equation form as:

$$\text{Contingency} = \text{Max Expected Resource Value} - \text{Proposed Resource Value}$$

$$\% \text{ Contingency} = \frac{\text{Contingency}}{\text{Max Expected Resource Value} - \text{Contingency}} \times 100$$

$$\text{Margin} = \text{Max Possible Resource Value} - \text{Max Expected Resource Value}$$

$$\% \text{ Margin} = \frac{\text{Margin}}{\text{Max Expected Resource Value}} \times 100$$

#### 6. Attitude and Control Requirements.

- Control method (3-axis, spinner, gravity gradient, etc.; for a spin stabilized spacecraft provide spin rate and axis in terms of spacecraft body coordinate frame);
- Control reference (solar, inertial, Earth-nadir, Earth-limb, etc.);
- Attitude requirements as a function of time during all science mission phases;
- Attitude control requirements for bias, drift, stability or jitter, and rate for scanning (each axis);
- Spacecraft attitude knowledge requirements at the instrument interface for bias, drift, jitter, and rate for scanning (each axis);
- Agility (maneuvers, scanning, etc.);
- Deployments (solar panel, antennas, etc.);



- Articulation (1- or 2 -axis solar arrays, antennas, gimbals, etc.);
- On-orbit calibration (alignment, line-of-sight, thermal deformation) and;
- Attitude knowledge processing (e.g., real-time versus post-processing, space-borne versus ground).

## 7. Instrument Characteristics.

For each instrument provide the following information as applicable:

- Instrument mass (include breakouts of electronics and aperture mass if known);
- Instrument viewing direction in body coordinates;
- Instrument operational modes;
- Instrument operational mode timeline;
- Data demand for each instrument operational mode;
- Onboard recording required from spacecraft;
- Power demand for each instrument operational mode including peak, average, and standby power;
- Supplemental power supplied by primary batteries;
- Statement of whether instrument is active or passive;
- Instrument thermal control capability;
- Bias, drift, and noise of instrument data used in pointing control and knowledge determination; and
- Character of significant instrument-generated jitter and momentum.

## 8. Spacecraft Characteristics.

To the extent known at the time of proposal submission, provide the following information (Note: for Missions of Opportunity, provide the information above that is related to the proposed investigation's requirements on, and interfaces with, the sponsor's instrument/spacecraft):

- Spacecraft Parameters:
  - A block diagram of the spacecraft subsystem components; and
  - Sensor and actuator information (precision/errors, torque, and momentum storage capabilities, etc.)
- Propulsion:
  - Estimated delta-V budget;
  - Propulsion type(s) (monoprop, bi-prop, dual-mode, solar electric, etc.) and associated propellant(s)/oxidizer(s);
  - Propellant mixture ratio (if bi-prop); and
  - Specific impulse of each propulsion mode.
- Communications:
  - Modes of communications operations -
    - For transmit only mode: Mode timeline, data rate(s), and duration;
    - For receive only mode: Mode timeline, data rate(s), and duration;

- For Rx and Tx mode simultaneously: Mode timeline, and duration; and
  - Surface relay capability for Scout orbiters of mission lifetime in science orbit greater than one Mars year.
- Command and Data Handling -
    - Spacecraft housekeeping data demand. If known, time-lined data demands shall be provided for each subsystem operational mode, i.e., for Guidance, and Navigation, and Communication; standby, fine pointing, and reaction wheel momentum management; and for Communications, transmit, and receive;
    - Data storage unit size (Mbits);
    - Maximum storage record rate; and
    - Maximum storage playback rate
  - Power -
    - Definition of each spacecraft subsystem operational mode over all science phases (Note: provide power demand as well as operational schedule (timeline) for each operational mode);
    - Type of array structure (rigid, flexible, body mounted);
    - Solar array axes of rotation (vector projected in spacecraft coordinates);
    - Array size;
    - Solar cell type and efficiency;
    - Expected power generation at Beginning of Life (BOL) and End of Life (EOL);
    - Worst case sun incidence angle to solar panels during science mission;
    - Battery type; and storage capacity;
    - Worst case battery Depth of Discharge (DOD); and
    - Spacecraft bus voltage.

For the Mars Scout proposals, a specific subsection of the Mission Implementation section (limit of 5 additional pages) may be included to discuss any proposed new technologies/advanced developments and the approach that will be taken to reduce their associated risks. Within this subsection, specific topics to be addressed should include:

- Identification and justification of the Technology Readiness Level (TRL) for each proposed new development and/or advanced development at the time the proposal is submitted (Note: see TRL definitions in Mars Scout Library and Mars Technology Program descriptions);
- Description of the proposed plan for bringing each of the identified items to a TRL of at least "Flight Qualified" by Confirmation Review (CR)/PDR (include discussion of simulations, prototyping, systems testing, life testing, etc., as appropriate);
- An estimation of the manpower, cost resources, and the schedule required to complete the above plans; and
- If any fallbacks/alternatives exist and are planned (Note: this is desirable but not mandatory) and describe the cost, schedule, and performance liens they will impose on the baseline design and the decision milestones for their implementation.

## G. MANAGEMENT AND SCHEDULE

This section should summarize the investigator's proposed management approach for the complete investigation including E/PO. The management organization (including an organization chart) and decision-making process should be described, and the teaming arrangement (as known) should be discussed. The responsibilities of team members, including contributors, and institutional commitments should be discussed. Unique capabilities that each team member organization brings to the team, as well as previous experience with similar systems and equipment, should be addressed. If no relevant previous experience is cited, the proposer must, as a minimum, discuss their approach to providing the appropriate services and/or capabilities to assure investigation success. The specific roles and responsibilities of the Principal Investigator and Project Manager must be described, although key project personnel (e.g., the Project Manager) need not be identified by name at this time. Risk management and risk mitigation plans must be described. This discussion should include identification of the top three to five perceived risks, descoping strategies (if relevant), and management strategies for control, allocation, and release of technical, cost, and schedule reserves and margins. When major subcontracts are required, the acquisition strategy including contract incentive policies should be described.

A project schedule to meet the proposed launch date and covering all phases of the investigation should be provided. The schedule should include, as a minimum, proposed major project review dates; instrument development; spacecraft development; instrument-to-spacecraft integration and test; launch vehicle integration; mission operations and data analysis; and planning and implementation of the E/PO program including synergy with the MEP E/PO plans. The schedule reserve and critical path (i.e., the sequence of major activities and milestones that must be accomplished in the planned sequence and are critical to implementation success) should be clearly identified.

Mission of Opportunity proposals should specifically address how the investigation team will interrelate with the sponsoring organization, organizationally and managerially. Mission of Opportunity proposals should also address:

- The status of the commitment from the spacecraft builder/owner or sponsoring organization to fly the proposed instrument or conduct the proposed investigation;
- If and how the proposed investigation relates to the spacecraft sponsor's overall mission objectives;
- The investigation development plan and how it fits in the development plan for the sponsor's mission;
- How the operations plan for the proposed investigation fits within the mission of the sponsoring organization; and
- The investigation organizational interfaces and plans for reporting to NASA.

## H. COST AND COST ESTIMATING METHODOLOGY

This section shall include an estimated cost of the investigation that encompasses all proposed activities, including all applicable mission phases, launch services, development of the ground data system, implementation of E/PO, fee, and contributions. These costs shall be consistent with the requirements described in Sections 3, 4, and 5 of this AO. Note that proposers of orbiter

missions of greater than one Mars year are required to specify the UHF payload integration costs but not include this integration estimate in the Total Mission Cost. The amount of funding required in each Fiscal Year should be identified by providing the data requested in Tables B1 and B2 for Mars Scout investigations. Mission of Opportunity investigations should utilize only those lines in the tables which are applicable and ignore those which are for full mission investigations. The top portion of Table B1 requests cost data relative to the NASA OSS Cost while the bottom portion requests cost data relative to Contributions. Table B2 summarizes the NASA OSS Cost by Phase. The completed tables will not be counted against the page limit. Table B2 gives the NASA inflation index to be used to calculate real year dollars. Proposers must submit the requested data in the formats shown in Tables B1 and B2.

The methodology used to estimate the cost, for example, grass roots estimates, vendor quotes, specific cost models, past performance, and/or cost estimating relationships from analogous missions should be discussed. Budget reserve strategy, including budget reserve levels as a function of mission phase, should be discussed. All assumptions used in developing cost estimates to help facilitate reviewer understanding the proposed cost estimates should be provided.

## I. APPENDICES

The following additional information is required to be supplied with the proposal as Appendices unless otherwise specified and have specified page limits. NO OTHER APPENDICES ARE PERMITTED.

1. Statement of Work (SOW) and Funding Information. A SOW is required regardless of whether the proposal is submitted from a non-Government or a Government institution. This SOW must include the performance criteria resulting from the AO (e.g., Section 4.2) as well as the requirements in a Phase A Concept Study report that is described in the *Guidelines and Criteria for the Phase A Concept Study* document available through the Mars Scout Library. This SOW must include general tasks statements for Phases B/C/D and for Phase E for Mars Scout Mission investigations and Missions of Opportunity investigations. All SOW's should include the following as a minimum: Scope of Work, Deliverables (including science data), and Government Responsibilities (as applicable). SOW's need not be more than a few pages in length. If more than one contractual arrangement between NASA and the proposing team is required, funding information must be provided that identifies how funds are to be allocated among the organizations with a separate Statement of Work for each organization.
2. Letters of Endorsement. Letters of endorsement must be provided from all U.S. and non-U.S. organizations offering critical facilities (e.g., integration and test, thermal vacuum chambers, L-Tool, etc.), goods, hardware, software, and/or services (including those of Co-Investigators), and from the provider of the launch services if the launch is not provided through a NASA contract. These letters must provide evidence that the senior officials of the participating institutions and/or appropriate Government officials are aware and supportive of the proposed investigation and will pursue funding for their stated participation in the investigation if it is selected by NASA and must be signed by officials authorized to commit those organizations as proposed. Failure to provide such

Letters of Endorsement from all parties involved in the proposal can be reason for declaring the proposal noncompliant and returned without review.

3. Resumes. Provide resumes for all science team members (PI and Co-I's) identified in the science section and, for all key project personnel who are identified by name in the proposal. Each resume should contain the following information in the following order:
  - a) the name and organizational address of the individual;
  - b) a one or two sentence description of the individual's job or role on the proposed investigation;
  - c) a resume that clearly shows the experience related to the responsibilities that the individual will perform for the proposed investigation, including the analysis and publication of final science results;
  - d) the commitment signature of the individual and date; and
  - e) if any portion of the commitment is by way of a contribution to the proposed investigation (that is, not to be supported by NASA through the proposal), the amount of the contribution in terms of approximate number of Full Time Equivalent (FTE) work years over the nominal duration of the proposed project (i.e., through Phase E) and the signature of an authorizing official of the individual's organization.

The complete resume forms may be no longer than two pages for each participant and should be organized alphabetically after that of the PI.

4. Draft International Participation Plan - Discussion on Compliance with U.S. Export Laws and Regulations. Investigations that include international participation, either through involvement of foreign nationals and/or involvement of foreign entities must include a section discussing compliance with U.S. export laws and regulations; e.g., 22 CFR 120-130, *et seq.* and 15 CFR 730-774, *et seq.*, as applicable to the scenario surrounding the particular international participation. The discussion must describe in detail, the proposed international participation and is to include, but not be limited to, whether or not the international participation may require the proposer to obtain the prior approval of the Department of State or the Department of Commerce via a technical assistance agreement or an export license, or whether a license exemption/exception may apply. If prior approvals via licenses are necessary, discuss whether the license has been applied for or, if not, the projected timing of the application and any implications for the schedule. Information regarding U.S. export regulations is available through Internet URL's <http://www.pmdtc.org> and <http://www.bxa.doc.gov>. Proposers are advised that under U.S. law and regulation, spacecraft and their specifically designed, modified, or configured systems, components, parts, etc., such as the instrumentation being sought under this AO, are generally considered "Defense Articles" on the United States Munitions List and, therefore, subject to the provisions of the International Traffic in Arms Regulations, 22 CFR 120-130, *et seq.* (See AO, Subsection 3.9.9.)
5. Outline of Technical Responsibilities between U.S. and International Partners. These outlines will be used by the Office of External Relations, NASA Headquarters, as the starting point for formalizing any required international arrangements (see AO, Subsection 3.9.3).

6. Compliance with Planetary Protection Requirements. NASA's Planetary Protection Policy (see NPD 8020.7E and NPG 8020.12B) imposes certain restrictions on mission operations and spacecraft cleanliness depending on the particular type of mission (orbiter vs. lander/life-detection vs. no life detection) and the specific environments on Mars to be visited. The proposal should indicate (i) the anticipated planetary protection Category of the mission under NASA directives; (ii) the proposed mission operational accommodations to comply with the anticipated requirement including organizational responsibilities; and (iii) the proposed steps to be taken for the preparation of the orbital or landed portions of the spacecraft to comply with the requirements for overall microbiological cleanliness and recontamination prevention prior to launch, if any. If necessary, the proposal should also indicate (iv) the nature of the proposed implementation of back-contamination control and subsequent containment and testing of returned samples, or the proposed rationale for the mission to be relieved from the containment requirement. This appendix should address both intended steps to be taken for planetary protection compliance and the organization(s) responsible for implementing those steps.
7. Compliance with Procurement Regulations by NASA PI Proposals. Proposals submitted by NASA employees as Principal Investigators should contain the following information concerning the process by which non-Government participants were included in the proposal. The proposal should: (i) indicate that the supplies or services of the proposed non-Government participant(s) are available under an existing NASA contract; (ii) make it clear that the capabilities, products, or services of these participant(s) are sufficiently unique to justify a sole source acquisition; or (iii) describe the open process that was used for selecting proposed team members. While a formal solicitation is not required, the process cited in (iii) above should include at least the following competitive aspects: notice of the opportunity to participate to potential sources, submissions from and/or discussions with potential sources, and objective criteria for selecting team members among interested sources. The proposal should address how the selection of the proposed team members followed the objective criteria and is reasonable from both a technical and cost standpoint. The proposal should also include a representation that the Principal Investigator has examined his/her financial interests in or concerning the proposed team members and has determined that no personal conflict of interest exists. The proposal must provide a certification by a NASA official superior to the Principal Investigator verifying the process for selecting contractors as proposed team members, including the absence of conflicts of interest.
8. List of Acronyms and Abbreviations.
9. References List. As an option, the proposal may provide a list of reference documents and materials used in its preparation. These documents and materials themselves may not be submitted except as a part of the proposal and included within the prescribed page count, nor should it be necessary to consult them to adequately review the proposal.

**TABLE B1**  
**TOTAL MISSION COST FUNDING**  
**FY Costs in Real Year Dollars (to nearest thousand), Totals in RY and Fixed Year '03**

Cost Element **	Formulation		SUBTOTAL Formulation*		Implementation			SUBTOTAL Implementation*		TOTAL LIFE CYCLE		
	FY1	FYx	RY \$	FY03\$	FY1	...	FYz	RY \$	FY03\$	RY \$	FY03\$	
<b>Start to Launch + 30 Days (Phases A/B/C/D)</b>	<b>Enter each cost element</b>											
Phase A Concept Study												
Proj. Mgmt/Miss. Analysis/Sys. Eng.												
Instrument A												
Instrument B												
Instrument ...												
Instr. Integration, Assembly and Test												
<i>Subtotal - Instruments</i>												
Spacecraft bus												
S/C Integration, Assembly and Test												
Other Hardware Elements (1)												
Launch Ops (Launch +30 days)												
<i>Subtotal - Spacecraft</i>												
Science Team Support												
Pre-Launch GDS/MOS Development												
DSN/Tracking												
E/PO												
Other (2)												
<i>Subtotal Phases A-D before Reserves</i>												
Instrument Reserves												
Spacecraft Reserves												
Other Reserves												
<b>Total Phases A/B/C/D</b>												
<b>Launch + 30 Days to End of Mission (Phase E)</b>	<b>Enter each cost element</b>											
Mission Operations & Data Analysis (including Project Management)												
DSN/Tracking												
E/PO												
Other (2)												
<i>Subtotal Phase E before Reserves</i>												
Reserves												
<b>Total Phase E</b>												
<b>Launch Services</b>												
<b>Total NASA Cost</b>												
Contributions (2)												
<b>Total Contributions</b>												
<b>Total Mission Cost =</b> →												

(1) Other Hardware Elements: Probes, Sample Return Canister, Etc.

(2) Specify each item on a separate line: e.g.; Tech Infusion/Transfer, facilities, etc.

\* Note: Formulation = Phase A + B; Implementation = Phase C + D + E

\*\* See **Program Cost Elements** document in Scout Program Library

**TABLE B2**  
**MISSION PHASE SUMMARY OF NASA OSS COST**  
FY Costs in Real Year Dollars (to nearest thousand); Totals in RY and FY 03 Dollars

Cost Element	TOTALS						
	FY1	FY2	FY3	...	FYn	RY \$	FY03 \$
Phase A Concept Study							
Additional Phase A (if required)							
Phase B							
Phase C/D							
Phase E							
Launch Vehicle/Launch Services							
<b>Total OSS Mission Cost</b>							
Contributions							
<b>Total Mission Cost</b>							

**TABLE B3**  
**NASA NEW START INFLATION INDEX**

Fiscal Year	2003	2004	2005	2006	2007	2008	2009
Inflation Rate	0%	3.1%	3.1%	3.1%	3.1%	3.1%	3.1%
Cumulative Inflation Index	1.0	1.031	1.063	1.096	1.130	1.165	1.201

Use an inflation rate of 3.1% for years beyond 2009.



## APPENDIX C

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### CONTENTS OF THE MARS SCOUT LIBRARY

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The Mars Scout Library includes documents available electronically via the Internet. Note that some of these documents are available via an Internet hyperlink to their home location. In either case, it is incumbent upon the proposer to ensure that the documents used in proposal preparation are of the date and/or revision listed in the Announcement of Opportunity or this Appendix whenever applicable.

The Mars Scout Library is accessible on the World Wide Web at the URL address:

<http://centauri.larc.nasa.gov/mars/marslib.html>

#### Office of Space Science Strategies and Policies

***The Space Science Enterprise 2000 Strategic Plan:***

This document is a concise statement of the goals and outlook of NASA's Space Science Enterprise. It is a compilation of the major ideas described in more detail in the context of the overall NASA Strategic Plan.

***The National Research Council (NRC) Committee for Planetary Exploration, COMPLEX, Report*** (November 2001).

Discusses COMPLEX's assessment of MEP science and priorities.

***Partners in Education: A Strategy for Integrating Education and Public Outreach into NASA's Space Science Programs*** (March 1995)

This document describes the overall strategy for integrating education and public outreach into NASA's space science programs.

***Implementing the Office of Space Science (OSS) Education/Public Outreach Strategy*** (October 1996)

This document describes the OSS overall approach to implementing its Education/Public Outreach strategy.

***Explanatory Guide to the NASA Office of Space Science Education and Public Outreach Evaluation Criteria*** (April 1999)

Answers to frequently asked questions, elaboration of each of the OSS E/PO criteria. Document is intended to give a flavor of what exemplary E/PO can be.

***The Space Science Enterprise Integrated Technology Strategy*** (October 1998)

Describes efforts to manage technology infusion into future OSS missions and to promote technology transfer to the private sector.

***OSS FY 2000 and 2001 E/PO Annual Reports***

Describes the status of on going OSS E/PO activities.

## Mars Exploration Program Documents

***Mars Exploration Program/Payload Analysis Group (MEPAG) Report*** (March 2001).  
***Science planning for Exploring Mars.***

***Mars Relay Description for Scout 2007 Proposals.***

***Mars Technology Program Overview.***

***Mars Program Public Engagement Plan.***

***Electra Mars Proximity Link Communications and Navigations Payload Description.***

Electra is the MEP UHF Mars in-situ relay asset which is potentially available to Scout proposers if available and applicable.

***Mars 2001 Lander Description.***

## Mars Scout Guidelines and Requirements Documents

***NASA's Mission Operations and Communications Service*** (March 2002).

Describes the functions and costs of Ground Data Systems and Mission Operations and Data Analysis available via NASA.

***Mars Scout Launch Services Information Summary*** (April 2002).

Provides information on capabilities and costs of launch services that are available to launch Mars Scout spacecraft selected pursuant to this AO.

***Navigation and Ancillary Information Facility Services for Mars Scout Missions*** (February 2002)

Provides information relative to the NASA Ancillary Information Facility and the SPICE capability for mission design, mission planning, observation planning, and interpretation of scientific observations.

***Cost Elements Definitions*** (April 2002)

Provides definitions for the major cost elements for proposals.

***Anticipated Costs and Capabilities of the NASA Curatorial Facility - Mars Scout Sample Return Missions***

Provides information relative to anticipated costs for using the NASA Curatorial Facility

***Guidelines and Criteria for the Phase A Concept Study*** (TBD).

Provides proposers who are selected via the AO guidelines for preparations of the Phase A Concept Study Report. It also defines the criteria by which the Phase A Concept Study Report will be evaluated.

### ***Technology Readiness Levels Definitions***

Provides definitions for technology readiness levels (TRL)

### ***Announcement of Opportunity (AO) Acronym List***

Provides a list of AO used acronyms.

## **General Guideline and Requirements Documents**

### ***Example Mission Definition and Requirements Agreement***

Provides an example of such an agreement.

### ***NPG 7120.5A--NASA Program and Project Management Processes and Requirements*** (April 1998).

Provides a reference for typical activities, milestones, and products in the development and execution of NASA missions.

### ***NPG 7100.10D Curation of Extraterrestrial Materials***

Requires that all extraterrestrial materials returned to Earth from Sample Return Missions be processed via NASA's Curatorial Facility at JSC.

### ***Planetary Data System Data Preparation Workbook*** (April 2001).

Describes the basic formats and requirements used for the archiving of planetary data products by the NASA Planetary Data System (PDS).

### ***Planetary Protection Requirements.***

Includes information on Planetary Protection Requirements for NASA spacecraft missions.

### ***ISO 9000 Series***

The following ISO 9000 quality documents describe current national and NASA standards of quality processes and procedures in compliance with the American National Standard, "Quality Systems - Model for Quality Assurance in Design, Development, Production, Installation, and Servicing," ANSI/ASQC Q9001-1994.

"Quality Management and Quality System Elements - Guidelines," ANSI/ASQC Q9004-1-1994.

"Quality Management and Quality Assurance Standards - Guidelines for Selection and Use," ANSI/ASQC Q9000-1-1994

"ISO 9000 and NASA," Office of Safety and Mission Assurance (Code Q) presentation, April 24, 1995.

Note: These first two ISO 9000-related documents are copyrighted and cannot be reproduced without appropriate compensation. For copies contact:

American Society for Quality Control (ASQC)  
P.O. Box 3066  
Milwaukee, WI 53201-3066

(800) 248-1946

***NASA Technology Transfer Resources*** (No date/revision).

The NASA Commercial Technology Network (CTN) serves as an integrated information resource for NASA technology transfer and commercialization.

***NASA Independent Assessment Team (NIAT) Report*** (December 2000).

This report provides results from a study of the Mars mission failure and provides recommendations for future mission success.

Directives and Procurement-related Information

***NASA Online Directives Information System (NODIS) II.***

Provides online access to the NASA Policy Directives (NPD's - formerly NMI's), NASA Procedures and Guidelines (NPG's - formerly NHB's) and NASA's Policy Charters (NPC's).

***Federal Acquisition Regulations (FAR) General Services Administration***

URL: <http://www.arnet.gov/far/>. Provides access to all FAR documents.

***NASA FAR Supplement (NFS) Regulations***

URL: <http://www.hq.nasa.gov/office/procurement/regs/nfstoc.htm>. Provides access to all NFS documents.

***NASA Financial Management Manual***

URL: <http://www.hq.nasa.gov/fmm/>

***NPG 5800.1D -- Grant and Cooperative Agreement Handbook*** (July 1996)

URL: <http://ec.msfc.nasa.gov/hq/grcover.htm>

***Environmental Quality Regulations***

URL: <http://www.access.gpo.gov/nara/cfr/index.html>

## APPENDIX D

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### CERTIFICATIONS

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The texts of the following required certifications are included for reference only. Submission of the signed printout of Web Cover Page (see Section A of Appendix B) certifies compliance with these certifications.

#### 1.0 Certification of Compliance with the NASA Regulations Pursuant to Nondiscrimination in Federally Assisted Programs

The (*Institution, corporation, firm, or other organization on whose behalf this assurance is signed, hereinafter called "Applicant "*) hereby agrees that it will comply with Title VI of the Civil Rights Act of 1964 (P.L. 88-352), Title IX of the Education Amendments of 1972 (20 U.S.C. 1681 et seq.), Section 504 of the Rehabilitation Act of 1973, as amended (29 U.S.C. 794), and the Age Discrimination Act of 1975 (42 U.S.C. 16101 et seq.), and all requirements imposed by or pursuant to the Regulation of the National Aeronautics and Space Administration (14 CFR Part 1250) (hereinafter called "NASA") issued pursuant to these laws, to the end that in accordance with these laws and regulations, no person in the United States shall, on the basis of race, color, national origin, sex, handicapped condition, or age be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any program or activity for which the Applicant receives federal financial assistance from NASA; and hereby give assurance that it will immediately take any measure necessary to effectuate this agreement.

If any real property or structure thereon is provided or improved with the aid of federal financial assistance extended to the Applicant by NASA, this assurance shall obligate the Applicant, or in the case of any transfer of such property, any transferee, for the period during which the real property or structure is used for a purpose for which the federal financial assistance is extended or for another purpose involving the provision of similar services or benefits. If any personal property is so provided, this assurance shall obligate the Applicant for the period during which the federal financial assistance is extended to it by NASA.

This assurance is given in consideration of and for the purpose of obtaining any and all federal grants, loans, contracts, property, discounts, or other federal financial assistance extended after the date hereof to the Applicant by NASA, including installment payments after such date on account of applications for federal financial assistance which were approved before such date. The Applicant recognized and agrees that such federal financial assistance will be extended in reliance on the representations and agreements made in this assurance, and that the United States shall have the right to seek judicial enforcement of this assurance. This assurance is binding on the Applicant, its successors, transferees, and assignees, and the person or persons whose signatures appear below are authorized to sign on behalf of the Applicant.

#### 2.0 Certification Regarding Debarment, Suspension, and Other Responsibility Matters Primary Covered Transactions

This certification is required by the regulations implementing Executive Order 12549, Debarment and Suspension, 14 CFR Part 1265.

A. The applicant certifies that it and its principals:

- (a) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency;
- (b) Have not within a three-year period preceding this application been convicted or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State, or Local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;
- (c) Are not presently indicted for or otherwise criminally or civilly charged by a government entity (Federal, State, or Local) with commission of any of the offenses enumerated in paragraph A.(b) of this certification;
- (d) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State, or Local) terminated for cause or default; and

B. Where the applicant is unable to certify to any of the statements in this certification, he or she shall attach an explanation to this application.

C. Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion -- Lowered Tier Covered Transactions (Subgrants or Subcontracts)

- (a) The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principles is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any federal department of agency.
- (b) Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

### 3.0 Certification Regarding Lobbying

As required by S 1352 Title 31 of the U.S. Code for persons entering into a grant or cooperative agreement over \$100,000, the applicant certifies that:

- (a) No Federal appropriated funds have been paid or will be paid by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, in connection with making of any Federal grant, the entering into of any cooperative, and the extension, continuation, renewal, amendment, or modification of any Federal grant or cooperative agreement;
- (b) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting an officer or employee of any agency, Member of Congress, or an employee of a Member of Congress in connection with this Federal

grant or cooperative agreement, the undersigned shall complete Standard Form -- LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

- (c) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subgrants, contracts under grants and cooperative agreements, and subcontracts), and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by S1352, title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

## APPENDIX E

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### MARS SCOUT PLANNING BUDGET PROFILE

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The table below provides NASA's best current estimate of the maximum available funding for Mars Scout Missions by year in Real Year dollars for the Fiscal Years (FY's) 2003-2008. Note that unused portions of funds in each of these years can be used in the following year if necessary. These levels represent the total available for new Mars Scout mission(s) to be selected through this AO for all costs to NASA OSS, including that for launch vehicle(s). Since there may be some variation in funds available at the time of Selection, some excursion from these numbers might be possible. In extraordinary circumstances, proposers can propose above these numbers, but should justify this in their proposal and understand that additional funding may not materialize.

	FY 2003	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008
Total (\$M RY)	5	23	90	115	94	15

Note: Proposers should include the proposed cost of the Phase A Concept Study in the FY 2003 estimate and should adequately address with supporting rationale their funding requirements for each year.

The table below provides NASA's best current estimate of the maximum available funding for Mars Scout Missions of Opportunity by year in Real Year dollars for the Fiscal Years (FY's) 2003-2009. Note that unused portions of funds in each of these years can be used in the following year(s) if necessary. These levels represent the total available for new Mars Scout mission(s) to be selected through this AO for all costs to NASA OSS. Since there may be some variation in funds available at the time of Selection, some excursion from these numbers might be possible. In extraordinary circumstances, proposers can propose above these numbers, but should justify this in their proposal and understand that additional funding may not materialize.

	FY 2003	FY 04	FY 05	FY 06	FY 07	FY 08	FY 09
Total (\$M RY)	3.1	8.3	5.0	1.6	.8	2.5	2.9

Note: Proposers should include the proposed cost of the Phase A Concept Study in the FY 2003 estimate and should adequately address with supporting rationale their funding requirements for each year.